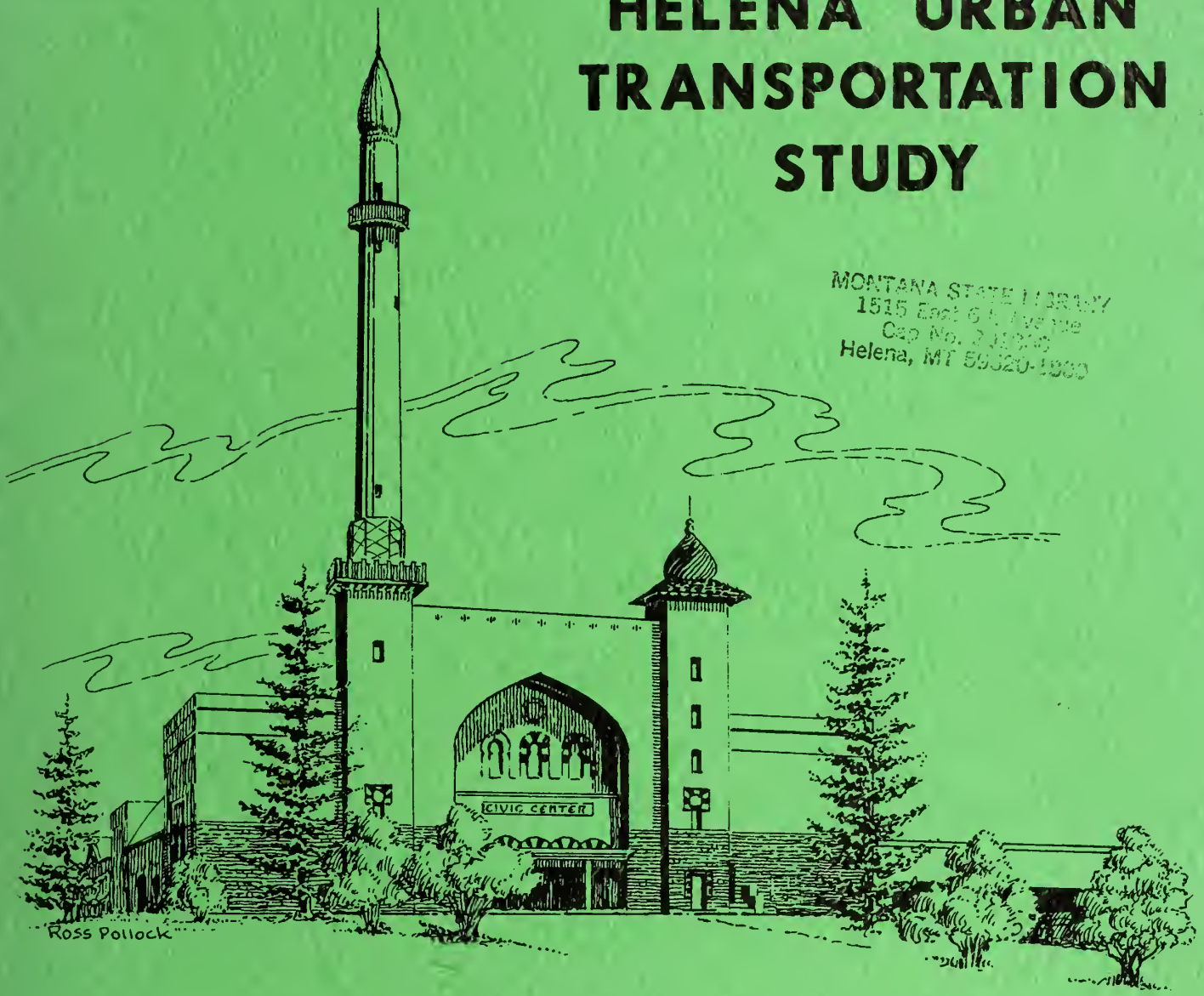
HELENA URBAN TRANSPORTATION STUDY



1970

HELENA MONTANA

H E L E N A

URBAN TRANSPORTATION STUDY

SUMMARY REPORT NUMBER 2

P A R T II

T R A N S P O R T A T I O N P L A N

Prepared by

MONTANA DEPARTMENT OF HIGHWAYS

PLANNING AND RESEARCH BUREAU

in cooperation with

CITY OF HELENA

COUNTY OF LEWIS AND CLARK

and

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

June 1, 1974 1970-1990 REF: HLN 610.4

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S U M M A R Y

The basic objective of the Helena Urban Transportation Study was to develop an areawide transportation plan to serve projected travel. The plan presented in this report was a product of cooperation between the transportation planning organization and the various governmental agencies. The following is a summation of significant facts about the transportation study.

CURRENT CONDITIONS

* Included in the transportation planning area was the City of Helena and the contiguous urbanized portions of the Helena Valley. The study area contains a total of 33 square miles.

* In 1970, study area population was determined to be 26,750 persons. These people own and operate over 15,500 motor vehicles.

* Over 10,900 people are employed in various enterprises within the transportation planning area. Government: Federal, State, County, and Local account for 34 percent of total employment, whereas retail trade and services account for 38 percent of the total.

* A total of 203 miles of roads, streets and highways are in use in the study area which carry approximately 212,000 vehicle miles each day.

* Recorded traffic volumes exceeded 12,000 vehicles per day in 1969 at the following locations

1. Euclid Avenue west of Benton Avenue
2. Lyndale Avenue from Benton to Last Chance Gulch
3. Montana Avenue from Lyndale to 11th Avenue
4. Prospect Avenue-11th Avenue, one-way couplets combined
5. Neill Avenue

* An external cordon survey was conducted in 1969 revealing that nearly 16,000 vehicles enter or leave the study area during a 24 hour period. Of these trips, 8 percent pass through the area. Nine percent

of the remaining trips are destined for the central business district.

* Daily travel within the Helena study area was estimated at nearly 110,000 trips or 4.1 trips per day per person.

* Helena and the jurisdictional area of the City-County Planning Board, have zoning ordinances and subdivision regulations as a means of encouraging proper development.

PROJECTIONS

* Projected 1990 population for the transportation planning area was estimated at 37,700 persons.

* Residential development is anticipated to occur predominantly in the north and southeastern portions of the study area.

* A total of 14,400 jobs are forecast for the Helena Transportation Study area by 1990.

* Industrial development is not expected to be a large contributor to the area's expansion.

* Projected area travel for 1990 was estimated at 180,000 trips or 436,000 daily vehicle miles.

* External travel is anticipated to increase from 16,000 to 35,500 daily trips by all vehicles.

* Principal generators within the area are expected to be the central business district and the Capitol area complex.

MAJOR STREET PLAN

* Assigned traffic loadings indicated that the east-west movement of traffic was most critical.

* Projected volumes exceeded 25,000 vehicles per day on portions of Euclid Avenue and over 20,000 vehicles per day on Lyndale and Montana Avenues.

* Estimates of right-of-way and construction costs for the major street plan including TOPICS type projects, totaled nearly thirteen million dollars.

* As a guide for construction programming, ten projects were selected as immediate priorities.

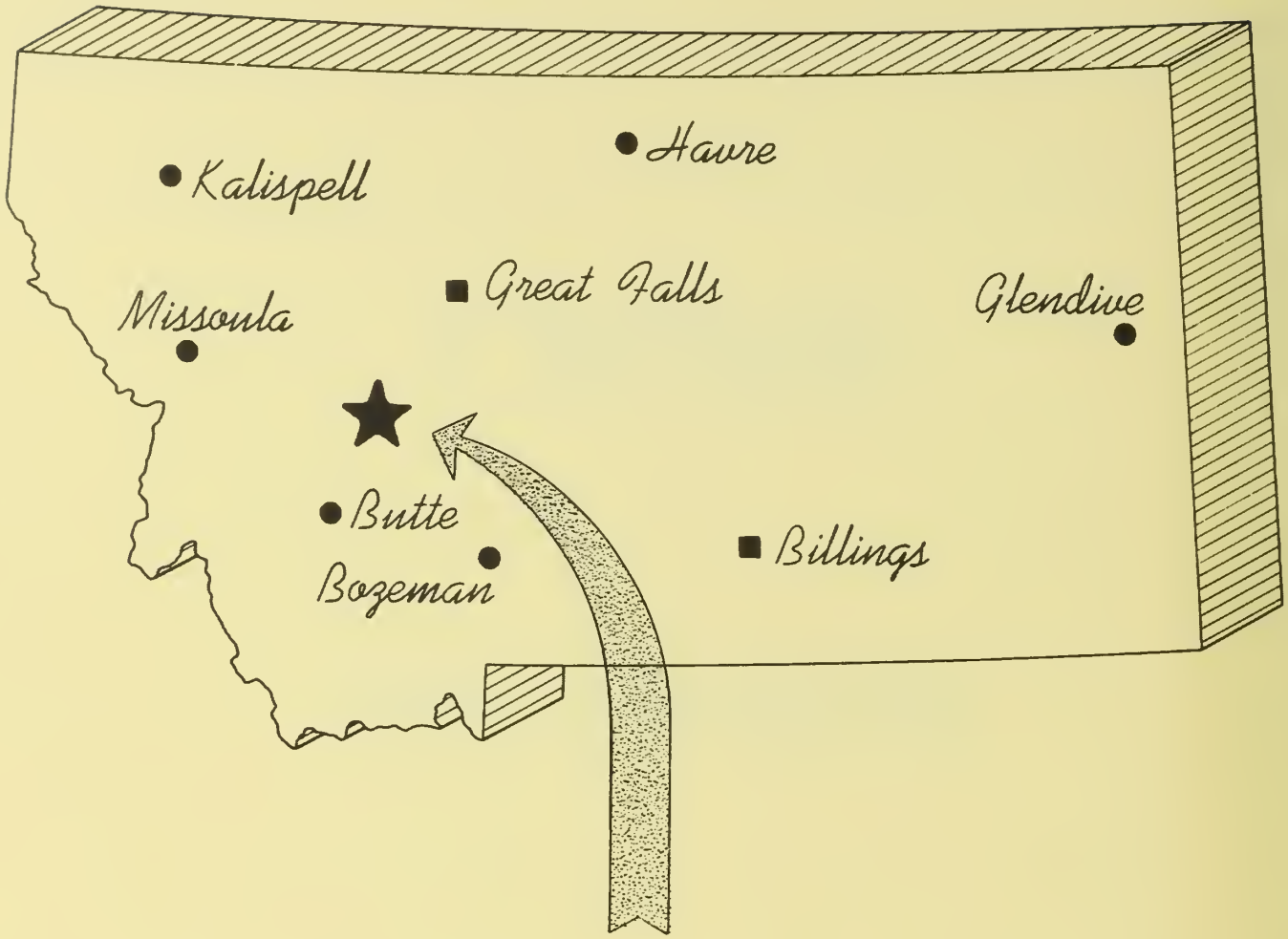
* Timetable for implementation of the major street plan will depend upon existing and contemplated funds available to the various involved governmental units.

* For any plan to be successful, it must be understood by the people directly affected. Their active participation in promoting the plan's objectives plays a leading role in its implementation.

CHAPTER I

INTRODUCTION

Geographic Location of



HELENA

CAPITAL CITY OF

MONTANA

Fig. I-1

Chapter I

I N T R O D U C T I O N

THE NEED FOR PLANNING

Transportation plays a vital role in the daily function of a city. People in the Helena urban area on a typical weekday complete in excess of 110,000 vehicle trips for work, personal business, shopping, social and recreational purposes and a myriad of other reasons. These trips amount to over 200,000 vehicle-miles of travel and consume 9,000 hours of driving time. With about 9,600 households in the urban study area, this means that members of an average Helena family each day average about 11 one-way vehicle trips, drive a total of 22 miles and spend slightly less than an hour behind the wheel of a car or truck.

In a larger sense, transportation has other influences on the lives of Helena people. It has a direct relationship to land development patterns in the community and affects the cost and time involved in shipments of raw materials and finished goods. It also interacts in innumerable other ways in providing access to job opportunities, residential housing choices, and social, educational and cultural opportunities.

To a large degree, our modern style of life is dependent upon the freedom to travel where and when we wish. This preference for personal transportation has led to a long term decline in public transportation modes, not only in Montana, but also across the Nation. In economic terms, Americans spend a considerable portion of their income for

cars and gasoline in order that the desire for mobility might be satisfied. On the national level, dependence on the automobile has led to serious traffic congestion in the cities and elsewhere, and with it, some equally serious side effects such as noise and air pollution. Congestion also occurs at particular times and places in Helena, but it is relatively minor and short lived compared to the rush hour traffic of larger cities.

There are current needs for street and intersection improvements in the Helena urban area and other needs will develop in the future. Area population is growing steadily, as will be shown later in this report, and vehicle ownership and trip making are both increasing more rapidly than population, as is true with most other urban areas in the nation. Two and three car families are now the rule rather than the exception. In theHelena urban transportation study area there is now an average of 1.53 vehicles for every occupied dwelling with 48 percent of the households actually owning or using two or more vehicles. A Montana Department of Highway's permanent traffic counter located in Helena on Montana Avenue north of Prospect Avenue indicates the average daily traffic has increased from 6,636 in 1957 to 13,254 in 1970, or approximately 100 percent in a period of 13 years. This increase in traffic continues unabated and indicates a need for serious planning of arterial streets and highways in the Helena area.

STUDY RESULTS

This report is the culmination of an intensive study of people and their use of streets and highways within the boundaries of the Helena urban area. The two most important results of this study are: first, solutions to the most serious current traffic problems, and second, a

plan for the major street network, with recommended improvements, which will provide for rapid and safe movement of motor vehicle traffic generated by the Helena area population through 1990.

This means, in addition to a study of existing streets and traffic, a realistic estimate of future traffic must be developed. The transportation study staff used a 20 year projection of traffic volumes to find specific locations along the present street network where problems will later develop and to test the overall adequacy and efficiency of the existing major street system in the forecast year. In final steps of the study procedure, this future traffic is analyzed in relationship to several possible variations of the future major street system.

The planning staff may proceed in one of several directions during these analyses of future traffic conditions. For example, it may be evident that a certain urban area has only very limited growth potential and that the existing street network would be adequate for a period of time with only minor street and intersection improvements. At the other extreme, another urban area may have very strong indications of growth and major route construction would be necessary to handle the expected traffic. Helena falls somewhere between these two extremes.

The estimate of future traffic has been and continues to be a predominant factor in the development of the major street network plan for the Helena urban area. The planning procedure, it must be emphasized, is a continuing effort, and as indicators of future travel such as population and vehicles change, the study and the resulting plan should be updated to reflect those changes.

STUDY FRAMEWORK

The United States Congress in the Federal Aid Highway Act of 1962

recognized the long standing need for comprehensive planning in urban areas. This act made continuing, comprehensive planning mandatory in all cities of over 50,000 population and encouraged it in the smaller cities such as Helena.

Due to the many transportation problems that had accumulated over a period of years, the Montana Department of Highways was requested by the city of Helena in 1969 for aid in conducting a transportation study of the urban area. It was requested that the Department of Highways develop a comprehensive long-range plan for a transportation system that would serve the Helena urban area to the forecast year of 1990. Although the Helena urban area has a population of less than 50,000, it was agreed that the study would be based on guidelines for such areas. This included the thorough analysis of the ten basic elements, as specified by the Federal Highway Administration, as well as the establishment of a Policy Coordinating Committee and a Technical Advisory Committee. Duties of the Policy Coordinating Committee included guidance and general supervision of the transportation planning process whereas the Technical Advisory Committee provided the technical procedures and standards for conducting the study.

In the Helena transportation study four levels of government have cooperated in completing or furnishing various elements of the study in accordance with terms of an agreement made in 1969. The agencies directly involved include the city of Helena, Lewis and Clark County, Helena City-County Planning Board, Planning and Research Bureau, Montana Department of Highways and the Federal Highway Administration, U. S. Department of Transportation.

Several of the major study elements considered have been accomplished and are being updated on a continuing basis by the Helena City-

County Planning Board including economic factors affecting development, current and projected population, present and future land use records, zoning and subdivision regulations, financial resources available for street improvements and statements relative to community goals and objectives.

The Planning and Research Bureau, Montana Department of Highways, has responsibility for the main part of the study procedure including inventories of transportation facilities, travel patterns, terminal facilities, all analyses of data and related forecasts.

The Federal Highway Administration, U. S. Department of Transportation, contributes both financial and technical resources to the study effort including the IBM 360 Urban Planning Program Battery. The Federal Highway Administration also conducts training schools for staff personnel and has been instrumental in developing the methodology and procedures used in these studies.

TOTAL COMMUNITY PLANNING

The transportation plan for Helena as presented in this report is intended to complement the Helena Comprehensive Plan. Those elements of the transportation study supplied by the Helena City-County Planning Board such as population and land use interface with the comprehensive plan. Other planning efforts being carried out by the city of Helena Urban Renewal and Model Cities Department were given full consideration during each step of the transportation study and in the development of the final transportation plan.

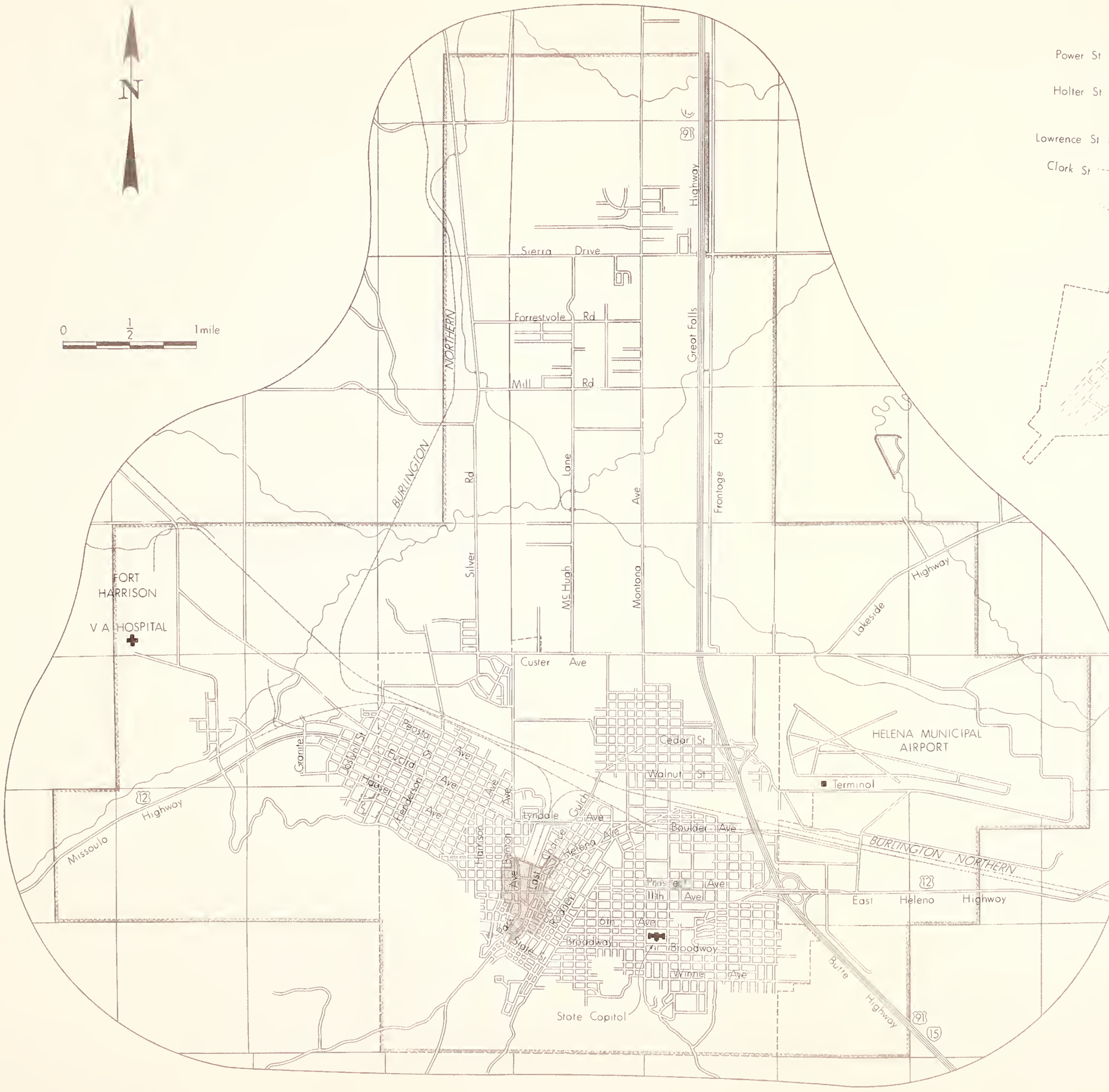
THE STUDY AREA

One of the earliest steps of the urban transportation study is to

define the geographic limits of the study area. This was accomplished for the Helena study with the advice and concurrence of the major cooperating agencies. The limits of the Helena study area are shown in Figure I-2. The study boundary includes all areas expected to become urbanized in the next 20 years. The area within the study boundary was subdivided into traffic districts for purposes of analyses. These districts are identified by a series of numbers and are shown in Figure VI-1.

The boundaries of the Helena Transportation Study extend north to include the Ehler's Corner-Vandenburg Village area, eastward to include the Helena Airport and the strip development on U. S. 12, southerly to Mount Ascension and Mount Helena, and westward to include the Broadwater residential area and Fort Harrison. The study area as delineated encompasses about 33 square miles.

1970 HELENA URBAN TRANSPORTATION STUDY



LEGEND

STUDY AREA

CENTRAL BUSINESS DISTRICT

1970 TRANSPORTATION STUDY AREA

Fig. I-2

CHAPTER II

AREA ECONOMIC FACTORS

Chapter II

AREA ECONOMIC FACTORS

INTRODUCTION

Inventories of population and economic activity are complementary studies, essential to sound transportation planning. An understanding of size, composition and spatial distribution of population is basic to planning for future development. These elements, in turn, are greatly influenced by economic conditions such as employment and income. Conversely, the population and its economic base influence the amount and types of land uses within the study area. The existing spatial relationship of various land uses and community facilities, integrated by a system of arterial streets and highways, is the basic building block of comprehensive urban transportation plan development.

This chapter presents a brief description and analysis of these factors as related to urban transportation planning.

LOCATION

The corporate limits of Helena contain over nine square miles which are located on the southern boundary of Lewis & Clark County, just east of the Continental Divide. The south edge of the city is bordered by mountains causing the growth to spread in a fan shaped development toward the north from the original settlement in Last Chance Gulch.

Helena is centrally located in respect to several of the State's

HELENA

urban transportation study

RETAIL TRADE AREA

fig. II-1

major cities. Great Falls, Missoula, Bozeman and Butte are all located within a radius of approximately 115 miles. More than 65 percent of the population of the State and 90 percent of the State's payrolls are located within this radius.

ECONOMIC HISTORY

Helena's early economy was based primarily on mining, following the discovery of gold in Last Chance Gulch in 1864. Early placer mining gave way to hardrock mining in both gold and silver and the town prospered to the extent that it called itself the richest city in the nation. By 1890, this extensive mining activity supported a population of 14,000 people and the wealth was handled by five prospering banks.

In 1874, Helena was able to win the territorial capitol from Virginia City, which added government to the local economy. In 1889, Montana became a state and in 1894, after five years of political turmoil, Helena became the official State Capitol. In these earlier times, state government had very limited powers and functions and winning the state capitol was primarily a matter of prestige.

Mining activities hit a peak during the period of 1890 through 1900 in the Helena region, but the national depression of 1893 and the crash of the gold and silver markets in that same year caused many people to leave the area. With the growing interest in government affairs, however, the community developed a bold political attitude and survived the hard times while many other mining towns in the State virtually disappeared. Helena endured as the State Capitol because of the persistance, ingenuity and wealth of the community and its geographic location in the State. Helena was, and still is, a center of civic, social, political and financial endeavors.

The community became a transportation, agriculture and trade center in its early development. In the period from 1858 to 1860, the Mullan Road was built on an east-west route from Fort Benton to Oregon. The road was routed just west of Helena and crossed the Continental Divide at Mullan Pass.[1] In 1883, the Northern Pacific Railroad reached Helena and with these major freight connections, the city became a distribution point for goods and services for a large area. In the early 1870's, stockmen brought cattle into the area, and farmers started dairy and produce markets. The fertile valleys provided the rancher with abundant grasslands and the farmer with sufficient water to allow agriculture to prosper.

During 1900-1910, Hauser and Holter Dams were built on the Missouri River. Along with supplying many jobs during this period, the resulting lakes gave the area a modern electrical source, irrigation water, and a great recreation potential. This recreation potential coupled with the rich history of Helena - the "Lewis and Clark Trail", Last Chance Gulch, etc, and a central location between two popular national parks, has made Helena a major tourist attraction.

Fortunately, Helena's early economy was boosted by the attainment of state government, which has become the largest generator of jobs in the urban area. To properly supply the government function, many state offices and jobs are located in the study area. Besides being headquarters for most State agencies, there are Federal, county and city offices, a large service trade, the East Helena Smelter, several other thriving industries and a growing tourist trade. With this economic

[1] This road linked the head of navigation on the Missouri River to the entire northwest region of the United States for over twenty years.

background, Helena has a strong, stable economy and a steadily growing population.

POPULATION

During the winter of 1864, the town of Helena was composed of a hundred log cabins located along the bottom of Last Chance Gulch. From this modest beginning, the town grew to a population of 3,600 in 1880. In the 1880's with the arrival of the Northern Pacific Railway and with spectacular discoveries of silver, Helena literally exploded to a total of nearly 14,000 people in the U. S. Census of 1890. A few years later, in 1893, a monetary panic spread across the nation, and many people left Helena in the depression which ensued. In the Census of 1900, the population of the city had fallen to under 11,000 people.

By 1910, a local recovery was evident, due in part to the development and economic stimulus of the large Drumlummon Mine at nearby Marysville. During the several decades it was worked, the mine produced untold millions in gold and silver ore. Between 1910 and 1930, the population of Helena remained relatively stable. A major earthquake in October 1935, devastated a considerable portion of the city and many people moved from the area in fear and shock. Following the earthquake and the great depression of the early 1930's, Helena again began to grow, reaching 15,000 people in the Census of 1940. A tabulation of the U. S. Census population totals is shown in Table II-1 together with county and state totals for the same periods.

During the last three decades the city of Helena, Lewis and Clark County, and the western portion of Montana have experienced substantial and continuing population growth, as shown in Table II-2. The western portion of Montana, in this tabulation of census data consists of all

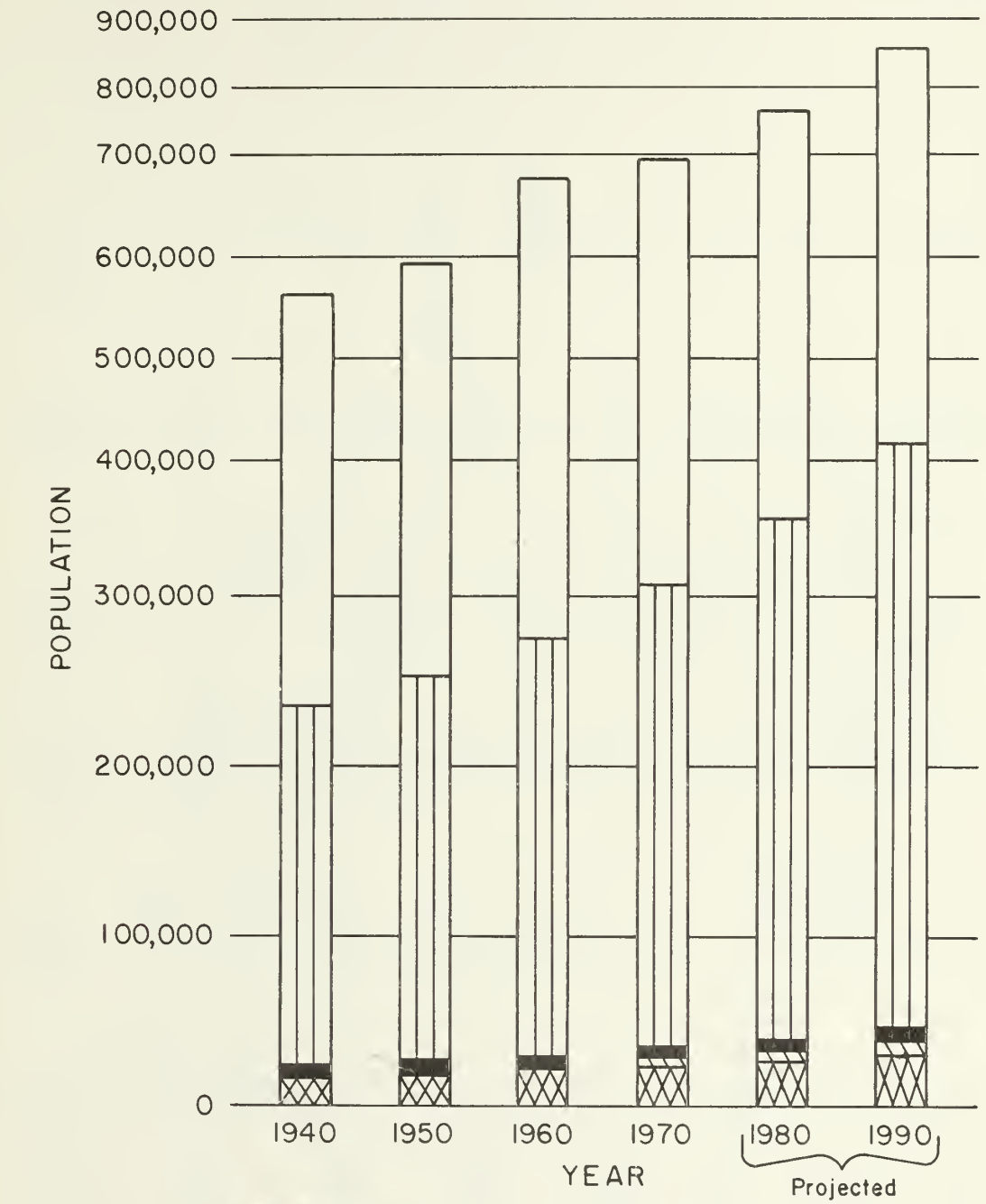
seventeen counties west of, and including Flathead, Lewis and Clark, Broadwater and Gallatin Counties. In terms of population, Helena and Lewis and Clark County have strong growth trends which suggest that the city and county share in the economic, recreational and other advantages of the western part of the State. It is presumed that such factors as moderate weather, proximity to recreational opportunities, pleasing scenery, water and land suitable for development, and increased employment are the principal reasons that the western counties have flourished in the last decade. Another intangible reason for this increase is the overflow from a mounting population pressure in the major urban areas of Pacific Coast states.

It should be noted that Helena is currently one of the faster growing urban areas within the State as shown in Table II-3. This growth indicates strength in the local economy, with much of the growth since the 1940's attributed to increased State and Federal employment. This increased employment in a basic employment field has led to other new jobs in other sectors of the Helena area economy. Table II-3 also illustrates the higher growth rates which are evident in most cities in Montana, with Butte and Havre the only declining cities in recent years.

The rate of growth for the city of Helena, though slowing slightly the last ten years, has been relatively constant during the last three decades. It is expected that this long term population growth rate, $1\frac{1}{4}$ percent per year, will continue unchanged through 1990. It should be emphasized that this projected rate of growth is in keeping with an established trend and should be valid in the future barring unexpected or cataclysmic events. As shown in Figure II-2, the city study area and county totals compared to regional and state totals have been and are

U.S. CENSUS POPULATION DATA 1940-1970

HELENA URBAN TRANSPORATION STUDY PROJECTIONS 1970-1990



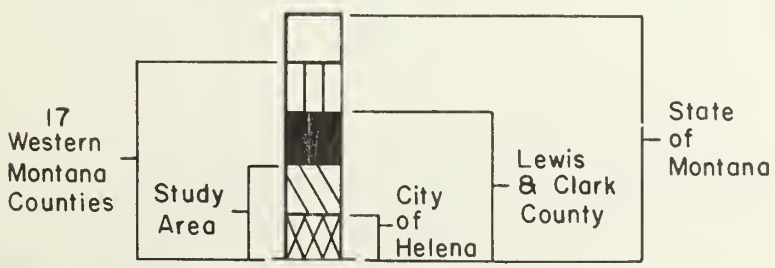


Fig. II-2

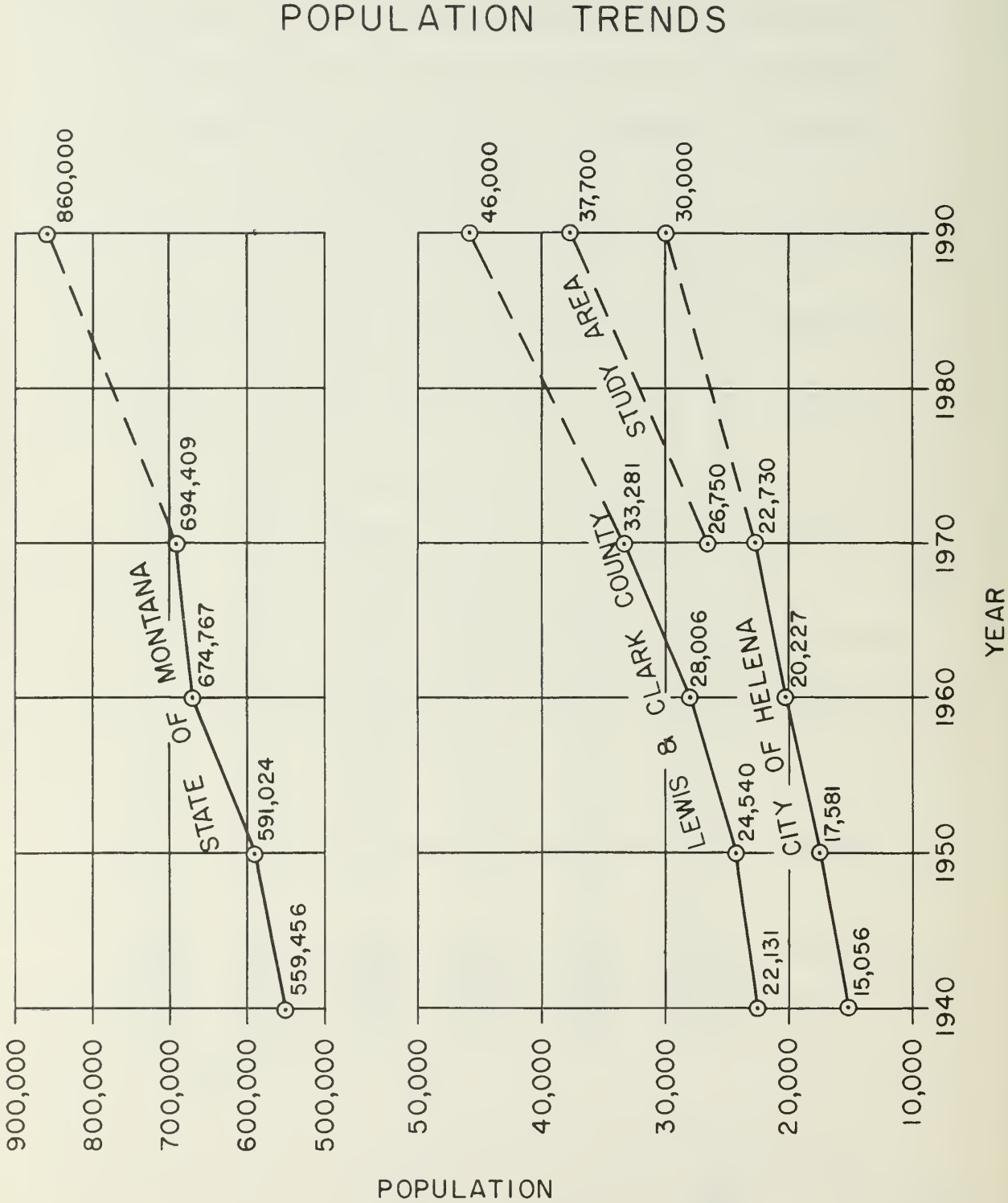

POPULATION TRENDS
860,000
694,409
674,767
591,024
559,456
MONTANA
STATE OF
46,000
37,700
30,000
33,281
26,750
22,730
28,006
24,540
22,131
20,227
17,581
15,056
STUDY AREA
CLARK COUNTY
LEWIS & CLARK COUNTY
CITY OF HELENA
900,000
800,000
700,000
600,000
500,000
50,000
40,000
30,000
20,000
10,000
1940
1950
1960
1970
1980
1990
YEAR
POPULATION

Fig. II-3

projected to grow at approximately the same rates. A plot of the census data from 1940 is presented on Figure II-3, together with the projections to 1990. The 1990 population figure for Montana (860,000) is an average of long-range high and low projections made by the U. S. Bureau of the Census and has been used as a reference point in a number of published population projections.[1] The city and study area projections were a study input supplied by the Helena City-County Planning Board.

The area outside the Helena city limits, but within the cordon line of the Helena Urban Transportation Study, is projected to grow at an annual rate of about 3 percent per year or over twice the rate of growth within the city limits. The population of this area outside the city limits was 4,021 in 1969 and is projected to increase to 7,700 in 1990. Even with this increase, the area outside the city limits in general will only be partially developed by 1990, though several small areas are now saturated, and others will probably become so in the next twenty years.

[1] Such as reported in the "Montana Highway Functional Classification and Needs Study, 1970-1990" and "Where Americans will live in 1990". U. S. News and World Report, April 10, 1972.

Table II-1

HISTORIC POPULATION DATA [1]

YEAR	CITY OF HELENA	LEWIS & CLARK CO.	STATE
1880	3,624	[2]	39,159
1890	13,834	19,145	142,924
1900	10,770	19,171	243,329
1910	12,515	21,853	376,053
1920	12,037	18,660	548,889
1930	11,803	18,224	537,606
1940	15,056	22,131	559,456
1950	17,581	24,540	591,024
1960	20,227	28,006	674,767
1970	22,730	33,281	694,409

[1] Source: U. S. Census

[2] County data not comparable due to boundary reconstitutions

Table II-2

U. S. CENSUS POPULATION DATA AND

PERCENT CHANGE, 10 & 30 YEAR INTERVALS

	1940	1950	PERCENT CHANGE 1940-50	1960	PERCENT CHANGE 1950-60	1970	PERCENT CHANGE 1960-70	PERCENT CHANGE 1940-70
City of Helena	15,056	17,581	+16.8	20,227	+15.1	22,730	+12.4	+51.0
L & C County	22,131	24,540	+10.9	28,006	+14.1	33,281	+18.8	+50.4
17 Western Counties	235,859	251,777	+ 6.7	274.194	+ 8.9	308,472	+12.5	+30.8
39 Eastern Counties	323,597	339,247	+ 4.8	400,573	+18.1	385,937	- 3.8	+19.3
State of Montana	559,456	591,024	+ 5.6	674,767	+14.2	694,409	+ 2.9	+24.1

Table II-3

COMPARISON OF POPULATION CHANGES[1]

FOR MAJOR MONTANA URBAN AREAS

1960 and 1970

CENSUS COUNTY DIVISION[2]	1960	1970	PERCENT CHANGE
Bozeman	13,361	18,670	+39.7
Missoula	39,159	50,669	+29.4
Helena and Helena West [3]	22,814	27,701	+21.4
Kalispell & Three Divisions Adjoining	19,225	22,345	+16.2
Great Falls & Great Falls East	64,907	74,151	+14.2
Billings	67,304	74,848	+11.2
Havre & Unincorporated Compact	11,908	11,631	-2.4
Butte, South Butte, Walkerville & Unincorporated Compacts	44,926	40,533	-10.8

[1] Source: U. S. Department of Commerce, Bureau of the Census, Census of Population, Montana 1960 and 1970.

[2] As constituted in the 1970 Census. Data for 1960 is for the comparable geographic area.

[3] Area is larger than the Helena Urban Transportation Study Area.

SCHOOL ENROLLMENT

Schools and colleges are major generators of urban traffic, with large numbers of trips destined to those institutions. Parents often make specific daily trips to either drop off or pick up their children at school sites, or travel out of their way on other trips, such as going to work, for this purpose. High school and college students commonly drive vehicles to and from classes, not to mention endless miles of other social and recreational driving. These trips contribute significantly to traffic on major streets in the vicinity of schools.

There are presently sixteen grade, junior high and senior high school sites in the Helena Urban Transportation Study area, in addition to Carroll College. In developing the traffic forecast for 1990, projected enrollments at the sixteen public schools were one of the main elements used in the forecasting procedure. The gross totals of these projected enrollments are shown in Table II-4, in addition to recent enrollment history.

A major assumption in these enrollment projections was that the birth rate, which has been falling Statewide and nationally since about 1968, will stabilize in several years and remain relatively constant through 1990. If we may consider the hypothetical situation of a city which has had a constant total population and a constant birth rate for several decades, total school enrollments would also become static. This situation was applied to the population now inhabiting the Helena study area, so that the future increase in school enrollments would result entirely from families migrating into the study area. A corollary assumption was that in-migrating families on the average would have numbers and age distributions matching those of the study area population.

Total elementary enrollments, grade 1 through 6, peaked in the study area in the 1967-68 school year at 3,370 students, fluctuated in a close range for several years, and then fell to 3,276 in the 1971-72 school year. Actual junior and senior high enrollments for the same period show modest increases, but both are eventually projected to level off, or decline slightly before resuming an upward trend in the late 1970's. Total grade school enrollment will have to show strength and begin to move upward in about 1975-1976, or the projections herein may prove to be somewhat high. In terms of distribution of total future enrollments to the various school sites, number of students at schools in established neighborhoods were generally adjusted slightly downward from present enrollments through 1990. Number of students at schools in growth neighborhoods were adjusted upward in general proportion to the expected population growth to 1990. Grade schools with the largest anticipated growth in enrollments were the Smith, Ray Bjork, Lincoln, Rossiter and Kessler schools and a new grade school facility projected for a site in the Sunhaven addition. Junior high school increases were allotted to the C. R. Anderson and Sunhaven Schools and to a planned facility at the Rossiter site. An enlarged facility at Sunhaven high school with a full three year curriculum by 1990 was also assumed. These distributions were made in accordance with the general priorities and recommendations of the Helena School District No. 1 administration.

Table II-4

SCHOOL ENROLLMENT

Grades	ENROLLMENT HISTORY					ENROLLMENT PROJECTIONS		
	1960-61	1965-66	1969-70	1970-71	1971-72	1975-76	1980-81	1990-91
1- 6	3027*	3263*	3340	3353	3276	3092	3306	3750
7- 9	1442*	1689*	1837	1905	1910	1988	2096	2527
10-12	1150*	1584*	1809	1883	1961	2130	2243	2685

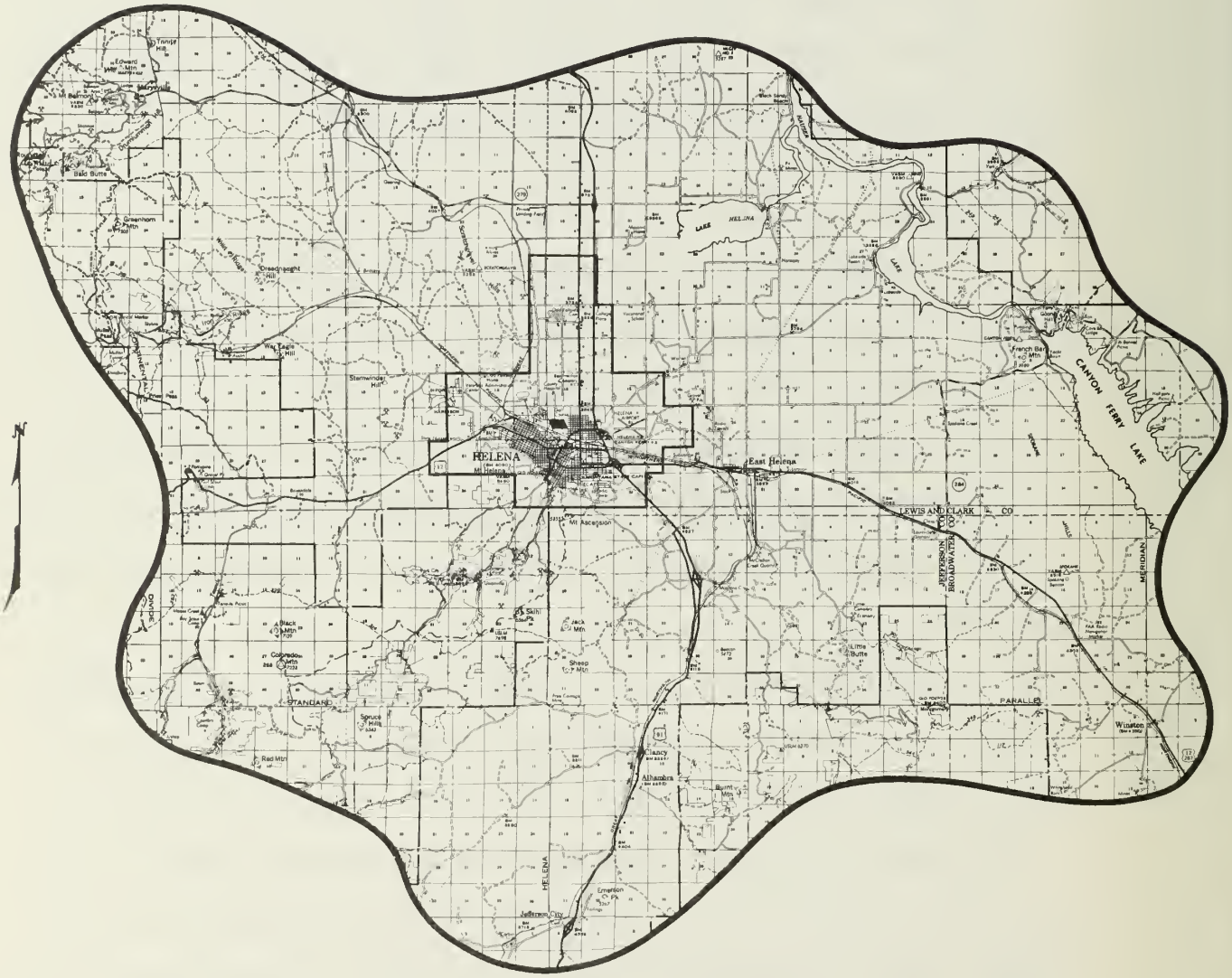
* Includes enrollments from Catholic schools now closed.

EMPLOYMENT

In the Helena Urban Transportation Study, both employment and population were analyzed in detail, in addition to determining the relationship between the two. It was found that the number of employed persons by place of work and by place of residence, were some of the most important indicators of vehicle travel within the study area. Thus, numbers employed became a major variable used in developing the forecast of future traffic.

As shown in Tables II-1, II-5 and II-6, population and employment have been increasing in recent decades in Lewis and Clark County, the city of Helena and the remainder of the county outside of Helena. Detailed census data relating to employment for the county and city was not published for years earlier than those included in Tables II-5 and II-6. Helena Urban Transportation Study data indicates there were approximately 1,700 employed individuals by the Census Bureau definition living in the study area outside the city limits, in addition to 9,842 employed individuals living within the city limits or a total of 11,542 persons employed. In a separate study procedure, employment by place of work was also inventoried, which indicated there were approximately 10,900 jobs located within the study area.

STUDY AREA & VICINITY



HELENA *URBAN TRANSPORTATION STUDY*

Fig. II-4

It has been assumed in this study that past trends in job hiring will continue in the study area through 1990, especially in the retail trade, professional services and government administration categories, as shown in Table II-6. Another major assumption was that the percentage of the total employed compared to the total population of the study area would remain constant through 1990. In the City of Helena, census data for 1960 and 1970 indicates this percentage remained almost level at 43.6 percent and 43.3 percent. The same percentages for Lewis and Clark County were 42.9, 41.9 and 42.0 percent for years 1950, 1960 and 1970, respectively, indicating very little change over a longer period of time.

INCOME

With the continuing growth of Helena and the study area in the past thirty years, the economic future of local residents looks bright. As shown by the Table II-7, the family median income for Helena in 1970 was somewhat higher than the county and considerably higher than the State. The trend is a steady growth of family income, with Helena consistently above the county and State. In comparison with other cities of the State, Helena ranks above every median income listed. In view of these historic trends, the income median is expected to continue above the State average.

One factor that should be recognized is that the study area, with its large government employment, has many jobs for women. Helena has a large number of working wives which raises the income per family figure.

Table II-5

EMPLOYMENT BY GENERAL INDUSTRY GROUP

LEWIS & CLARK COUNTY, MONTANA, 1950, 1960, 1970

	1950	1960	1950-60 PERCENT CHANGE	1970	1960-70 PERCENT CHANGE	1950-70 PERCENT CHANGE
Agriculture & Forestry	907	764	-15.8	690	-9.7	-23.9
Construction & Mining	1,230	1,044	-15.1	1,416	35.6	15.1
Manufacturing	952	959	0.7	813	-15.2	-14.6
Transportation, Communications and Utilities	1,089	1,107	1.7	1,105	-0.1	1.5
Wholesale & Retail Trade	1,944	2,092	7.6	2,683	28.3	38.0
Personal Services	1,525	1,900	24.6	1,863	-2.0	22.2
Professional Services	1,306	2,037	56.0	3,330	63.5	155.0
Public Admininstration	1,473	1,620	10.0	2,089	29.0	41.8
Other Industry	111	223	100.9	---	---	---
TOTAL EMPLOYED 16 YRS OLD & OVER	10,537	11,746	11.5	13,989	19.1	32.8

Source: U. S. Census Bureau

Table II-6

EMPLOYMENT BY GENERAL INDUSTRY GROUP
for the
CITY OF HELENA AND THE REMAINDER OF LEWIS & CLARK COUNTY

	CITY			COUNTY REMAINDER		
	1960	1970	1960-70 PERCENT CHANGE	1960	1970	1960-70 PERCENT CHANGE
Agriculture & Forestry	113	115	1.8	651	575	-11.7
Construction & Mining	785	842	7.3	259	574	121.6
Manufacturing	612	490	-19.9	347	323	-6.9
Transportation, Communications & Utilities	886	811	-8.5	221	294	33.0
Wholesale & Retail Trade	1,610	1,955	21.4	482	728	51.0
Personal Services	1,575	1,450	-7.9	325	413	27.1
Professional Services	1,728	2,693	55.8	309	637	106.1
Public Administration	1,314	1,486	13.1	306	603	97.1
Other Industry	188	---	---	35	---	---
TOTAL EMPLOYED	8,811	9,842	11.7	2,935	4,147	41.3

Source: U. S. Census Bureau

Table II-7

MEDIAM FAMILY INCOME

	1950	1960	1970
Helena	$3,916	$7,048	$10,470
Lewis & Clark County	3,830	6,461	10,277
State of Montana	3,292	5,403	8,512
Bozeman	-	6,399	8,776
Butte	-	5,729	8,121
Havre	-	6,680	9,500
Kalispell	-	6,833	8,633
Missoula	-	6,065	8,810
Billings	-	7,142	7,155
Great Falls	-	6,554	7,721

Figures from 1970 U. S. Census

VEHICLE REGISTRATIONS

It was found in this study, not unexpectedly, that the number of vehicles available to study area people had a direct and positive bearing on the number of vehicle trips made by these people. Thus, vehicles owned or regularly used within the study area was one of the major variables used in the trip forecasting procedure.

Registration data dating back to 1950 is shown in Figure II-5 for passenger cars and trucks. As this historic data is available only at the county level, additional data was tabulated during the study which provided more detailed information relating to vehicle ownership in 1969 both in the county and study area. This additional data provided the basis from which the projections of future vehicle registrations were made. The forecasted registrations for 1990 are also shown in Figure II-5.

Vehicle registrations in Lewis & Clark County more than doubled in the period 1950 to 1970, increasing by a factor of 2.18, while popula-

VEHICLE REGISTRATION TRENDS

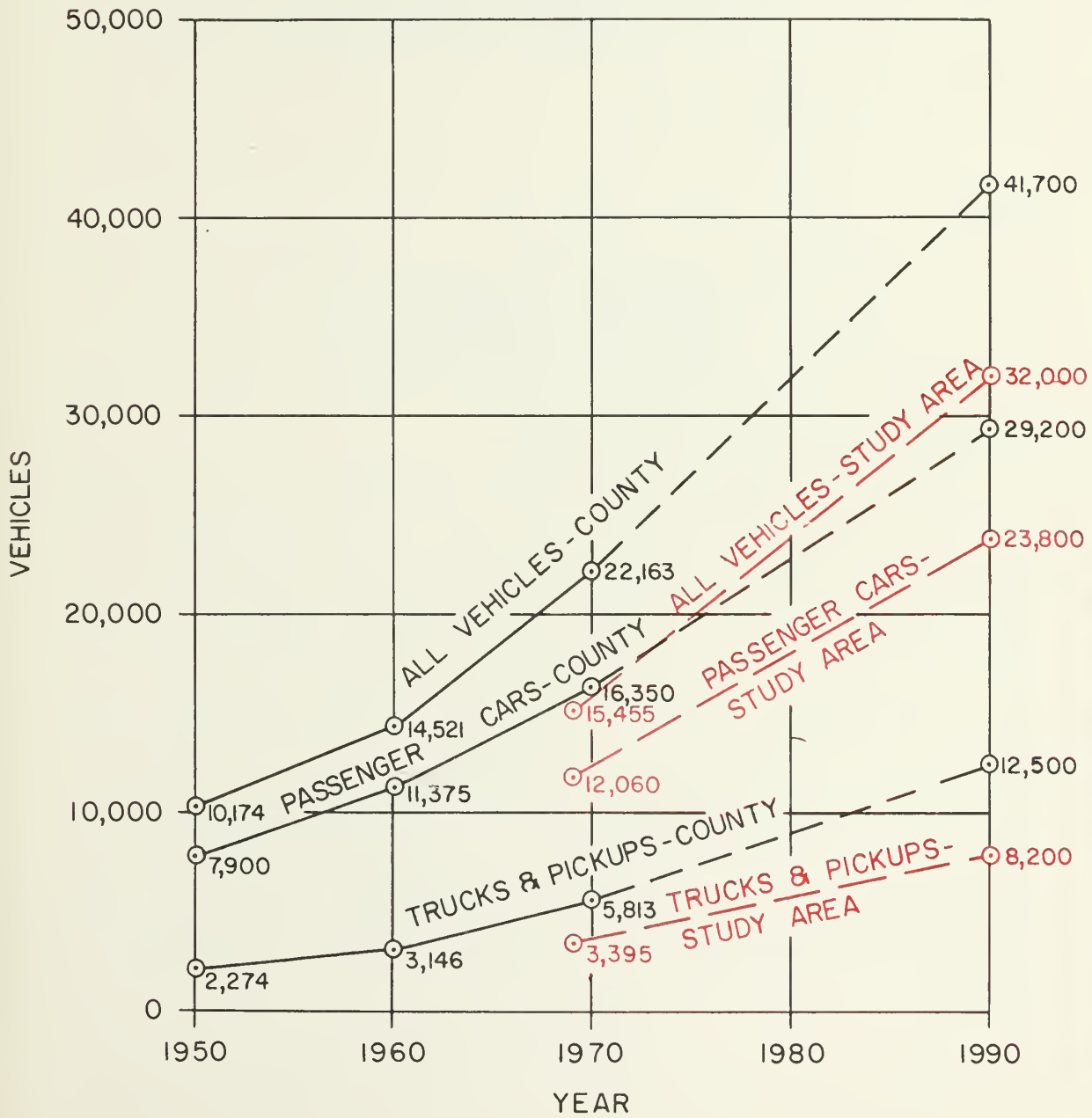


Fig. II-5

tion rose by a factor of 1.36 during the same period. Between 1970 and 1990, the rise in car and truck registrations is expected to be more modest, increasing by a factor of 1.88. Population is projected to increase by 1.38 factor for the same 1970 to 1990 period. Relating total vehicles to total population, we observe that there were 0.41 vehicles per person in the county in 1950, rising to 0.67 vehicles per person in 1970, and further projected to increase to 0.91 vehicles per person in 1990. This is a difference of 0.26 vehicles per person between the 1970 and 1990 values.

SUMMARY

Opportunities for increased employment stem directly from increasing job opportunities in the service industry, trade industry and government jobs. This employment trend has and will be the future economic growth factor for the city of Helena.

Agriculture, mining and manufacturing are not expected to show any large growth in the near future. One possibility which should be exploited is the need for manufacturing and industry in the study area. With the rate of Helena's overall development prospects less than optimistic, the area will have to strive to obtain new industry. However, with the strong basic economy of government, the city and area should continue its current growth trends. Because of Helena's occupations and industries are unlike that of the State or national trends, the study area is not likely to follow State or national development patterns.

CHAPTER III

LAND USE

Chapter III

L A N D U S E

INTRODUCTION

Land use and population trends play a key role in determining the best methods to use in developing future projections. These two elements are treated individually in this transportation study

The term "Land Use" refers to the purpose for which land or the facility or structure on the land is being used. Through field survey, each parcel of land is classified according to its observed use. By classifying land use, a means is provided to develop data that can be compiled graphically and statistically to reflect the composition of the community and its environs. As an outgrowth of this data, land use patterns, types, intensities, and eventually trends can be determined.

The land use catagories as established for this study are as follows:

(1) Residential, (2) Commercial, (3) Industrial, (4) Public & Semi-public, (5) Streets and rights of way, and (6) Vacant and agricultural.

Each land use creates separate and distinct traffic generating characteristics. Travel desires developed by the various land uses directly influence trip volumes and types. Collectively, these trips produce the traffic load on the existing transportation system. Thus, it becomes apparent that land use planning and transportation planning are so interrelated that one cannot be developed without consideration of the other.

The land use survey for the study area was performed by the Helena City-County Planning Board in 1970. The 1970 major land use classifications for the study area are represented in Figure III-1. The study area contains 33 square miles, of which approximately 30 per cent is within the incorporated limits of the City of Helena.

EXISTING LAND USE

Classifications have been made on the basis of actual land usage within land ownership parcels. The tabulated results of the survey of existing land use in the study area are shown in Table III-1. A review of this table indicates that of the 21,280 acres in the study area only 8,369 acres, or 39.3 percent are developed while the remainder is agricultural and vacant land.

The overall land use pattern can generally be described as low density with residential sections being bordered by strips of commercial development along the major streets. Euclid Avenue, Montana Avenue and the 11th Avenue-Prospect Avenue couplet are examples of this type of development. There is a relatively high number of moderate to large size areas of open space within the study area which makes the physical urban development pattern appear fragmented. Some area development is controlled by the physical features of the land, being too steep and rocky to be suitable for normal development. The major land use is residential, which accounts for 17.5 percent of the total study area. Within the City of Helena the Transportation Study reports 8,040 housing units of which 60.0 percent were single family residences, 38.3 percent multi-family type and 1.7 percent were mobile home or trailers.

Commercial land use amounts to approximately 408 acres or 1.9 percent of the total study area. Industrial land use has been generally

confined to the transportation corridors and adjacent land. Industrial land use of 55 acres is only 0.3 percent of the total area. Public and semi-public land uses, including schools, churches, parks, cemeteries, the Helena City-County Airport, the Lewis & Clark County fairgrounds, the State Capitol and the Fort Harrison Military Reservation, account for 2315 acres, or 10.9 percent of the study area, Street, road & highway rights of way, total 1849 acres, or 8.7 percent of the total area.

TABLE III-1

EXISTING LAND USE-HELENA URBAN TRANSPORTATION STUDY AREA

1969

CLASSIFICATION	AREA IN ACRES	PERCENT OF DEVELOPED AREA	PERCENT OF TOTAL AREA	ACRES PER PERSON
Residential	3,742	44.7	17.5	.14
Commercial	408	4.9	1.9	.02
Industrial	55	0.6	0.3	.002
Public & Semi-Public	2,315	27.7	10.9	.09
Street, Road & Highway Rights of Way	1,849	22.1	8.7	.07
Total Developed Area	8,369	100.0	39.3	.31
Vacant & Agricultural	12,911		60.7	.48
Total Study	21,280		100.0	.80

Source: Based on a 1970 study area population of 26,750; 22,730 for the city of Helena (U.S. Census) & 4,020 for the remainder of the Study Area outside the city limits.

1970 HELENA URBAN TRANSPORTATION STUDY

N

0 ½ 1 mile

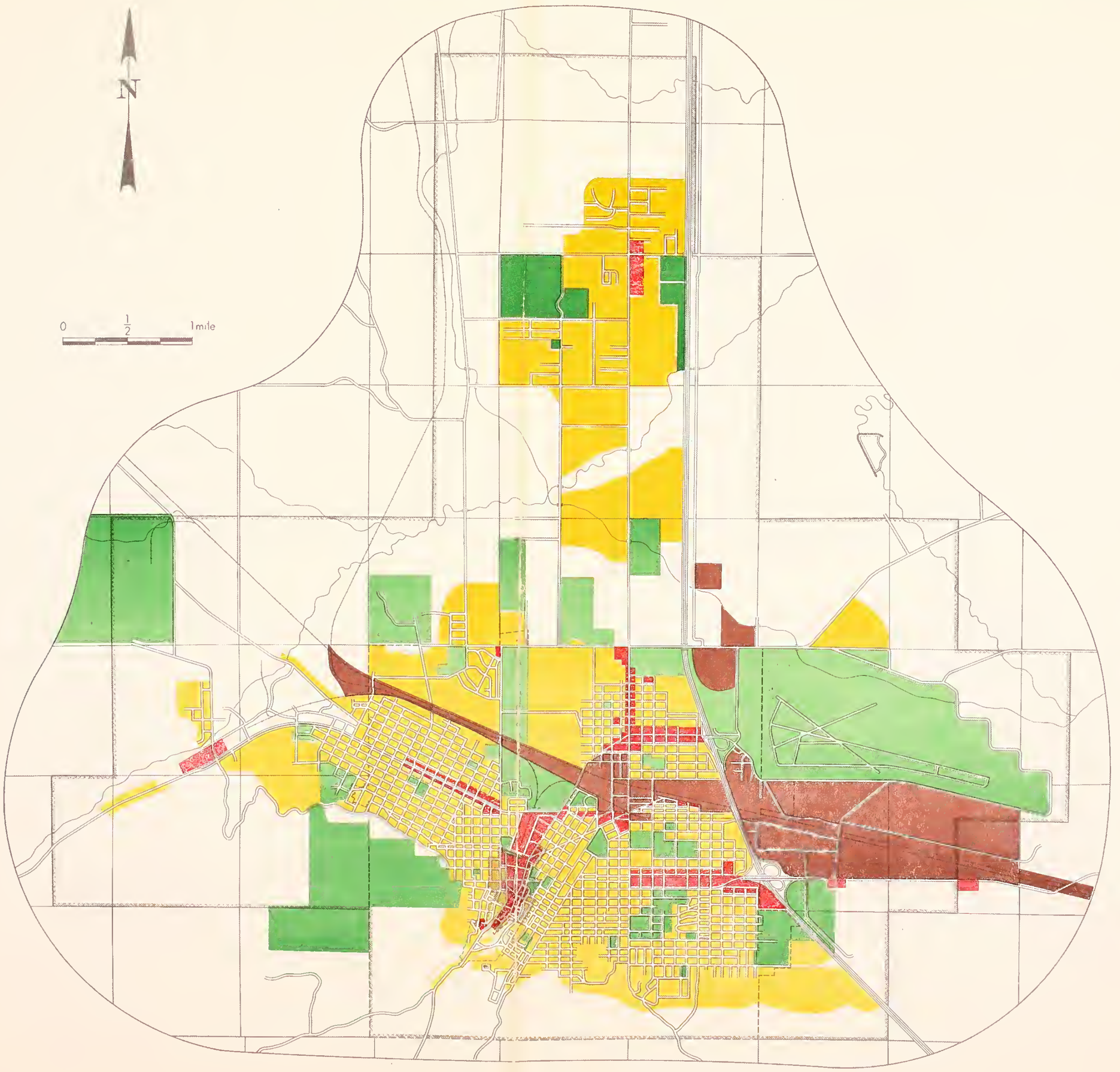
LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- PUBLIC-SEMI PUBLIC

1970 LAND USE

Fig. III-1

1970 HELENA URBAN TRANSPORTATION STUDY



LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- PUBLIC-SEMI PUBLIC

1990 LAND USE

Fig. III-2

FUTURE LAND USE PROJECTIONS

Projections of future land use in the Helena Urban Transportation Study area were based on data relating to the existing patterns of land use, with the location of new development being approtioned largely to those areas now vacant and to those areas where changes of land use were assumed to be feasible. This apportionment of new development was also based on land use zoning in the Helena Comprehensive Land Use Plan, as formally adopted in 1969. The distribution and locations of the major categories of projected land uses for 1990 are shown in Figure III-2.

The present distribution of residential development as shown in Figure III-1 indicated several major areas within the present city limits which are now open for development. Based on Land use zoning contained in the Helena Comprehensive Land Use Plan, it is anticipated that these major undeveloped areas in the City of Helena will be held for residential construction, and will be approaching full utilization by 1990, as shown in Figure III-2. There is of course, a substantial amount of land in the southern sections of the city having slopes too steep for any future development.

Major residential developments have been planned and are now under construction in the Diehl Heights area in the southeast quadrant of the city, and in the McHugh-Northside areas of Helena, Other areas projected for residential development include the Broadwater-Kessler-Sunhaven area, and the Helena Valley area north of the City of Helena.

Though the Helena Valley has experienced substantial growth in recent years, there are some factors which may affect future growth in that area. The first factor is that there are no sewer collection lines, no water distribution lines, and no treatment of either the sewage or the water supplies in that large section of the study area. Although

water supply contamination has not yet reached objectionable levels, it is felt that heavy increases in population in that section will eventually force the installation of both water and sewer lines. As the pattern of residential development is very dispersed and random, the cost of these lines will be very high. A second factor is that development has generally occurred along existing roads, and access to much property back from the roads has been severly limited. Easements to improve access to these isolated properties are a definite problem.

The only other matter relating to residential distribution is one of population density, that is, persons per residential acre. Though the trend within the City of Helena in the last several years has been towards the construction of apartments and other multiple family units, it is felt this is a temporary situation which will soon end, and the construction of single family residences will again predominate. Much of this higher density housing construction has resulted from a shortage of rental units, stemming in part from the extensive demolition being carried out by the City of Helena Urban Renewal Department in an area that once contained many small, substandard rental apartments. It has been assumed in this study that the strong local preference for, and the economic feasibility of single family residences which has prevailed in the City of Helena in the past will continue through 1990. The trend of residential construction outside the City Limits but within the study area remains strongly single family-low density and this pattern will likely prevail into the future.

Commercial land use activity, now clustered in the Central Business District and along the more central major highway routes, is expected to continue shifting towards the out-lying shopping centers, and farther out along the major routes. There are now three major shopping center areas

1970 HELENA URBAN TRANSPORTATION STUDY

LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- (1) DISTRICT NUMBER
- DISTRICT BOUNDARY
- 50 PERSONS 1970
- 50 PERSON GAIN 1970-1990

1970 – 1990 POPULATION DISTRIBUTION

Fig. III-3

located along US 12 and US 12 Bypass, and two others are in preliminary planning stages. Of the two being planned, one is proposed for Cedar Street off Interstate 15, and the other is proposed for Montana Avenue near Ehlers Corner. Another site mentioned for a future shopping complex is located southeast of the Montana-Custer Avenue intersection. Some new commercial activity is also projected to move into the Urban Renewal District.

Industrial land use is currently not extensive, being located adjacent to the Airport and along and between the two sets of Burlington-Northern tracts cutting diagonally across the City of Helena. Some minor, new industrial plants are expected to be located in this same general vicinity by 1990.

The main economic activity of the Helena area is the various departments of the State of Montana, which in terms of land use classification fall in the "public" category. The State Capitol complex is located in the southeast quadrant of the city. Although there is some vacant land just east of the existing complex available for expansion, the area is small, which has led several departments to seek other sites. The State Department of Highways now owns a site southeast of the Capitol Interchange, just off US 12, with plans to move the entire department to that location in five to ten years.

CHAPTER IV

TRANSPORTATION FACILITIES

Chapter IV

T R A N S P O R T A T I O N F A C I L I T I E S

INTRODUCTION

Before the future transportation needs of the Helena urban area could be determined it was necessary that the existing facilities for moving people and goods be inventoried and analyzed. In the Helena area these facilities are primarily streets and highways.

The inventory and analysis of Helena's existing transportation facilities are broken down into six divisions for this study: present street use (classification), capacity, travel time, accidents, traffic volumes, and public transit. These have been used in an effort to determine the level of service provided by the present transportation system.

Some of the physical features of the system, such as traffic signals, parking, and signing are discussed in more detail in Chapter VIII, "Traffic Operations Program to Increase Capacity and Safety."

PRESENT STREET USE

The Federal-aid Highway Act of 1968 provided for a systematic nationwide functional highway classification study to be made in cooperation with the Department of Highways and local governments. Definitions of the various classification of roads, streets, and highways were contained in the National Highway Functional Classification Study Manual prepared by the U. S. Department of Transportation, Federal

Highway Administration. This required study was performed in the Helena area in 1968 and the arterial and collector streets so determined corresponds generally with like classifications as defined by the National Committee on Urban Transportation (NCUT). The street usage, classification and definitions in this study are based on the 1968 Functional Classification Study criteria.

Four categories for the functional classification of streets are recommended in the National Highway Functional Classification Study Manual. These are: principal arterials, minor arterials, collectors, and local streets. Principal arterials, minor arterials, and collectors comprise the Major Street System and are collectively so called throughout this report. Local streets are generally considered outside the purview of the Urban Transportation Study and, except for classification, are not considered in this report.

Following is a brief description of each classification:

Principal Arterial System

This system of streets and highways should serve the major centers of activity of a metropolitan area, the highest traffic volume corridors, and the longest trip desires; and should carry a high proportion of the total urban area travel on a minimum of mileage. The system should be integrated, both internally and between major rural connections.

The principal arterial system should carry the major portion of trips entering and leaving the urban area, as well as the majority of through movements desiring to bypass the central city. In addition, significant intra-area travel, such as between central business districts and outlying residential areas, between major inner city communities, or between major suburban centers should be served by this class of facilities. Frequently, the principal arterial system will

carry important intraurban as well as intercity bus routes. Finally, this system in urbanized areas should provide continuity for all rural arterials which intercept the urban boundary.

Urban Minor Arterial Street System

The minor arterial street system should interconnect with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than major arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system.

Urban Collector Street System

The collector street system differs from the arterial systems in that facilities on the collector system may penetrate neighborhoods, distributing trips from the arterials through the area to the ultimate destination which may be on a local or collector street. Conversely, the collector street also collects traffic from local streets in the neighborhood and channels it into the arterial systems. In some cases, due to the design of the overall street system, a minor amount of through traffic may be carried on some collector streets.

Urban Local Street System

The local street system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through traffic movement usually is deliberately discouraged.

Other than Interstate Route 15, there are no freeway or expressway type facilities in Helena, which is quite normal for a city of this size. The discussion that follows will, therefore, be confined to the arterial and collector system.

A review of the existing street system indicates that, in general, the streets that comprise the major arterial system are not in compliance with the recommendation that major arterials be spaced approximately one mile apart, with the spacing of the collectors at approximately one-half that interval. The purpose of these recommendations is that such spacing will help insure each type of street to perform its assigned function more effectively. Due to the limitations imposed by the geographic features in the older areas of Helena and the non-uniform grid system, no uniform spacing is possible. In the newer, rapidly developing flat areas of the valley to the north, it is possible to apply the theories of model classification. Spacing variations from the recommendations contained in the study manual do not appear to present a particular problem.

Regarding the collector system in Helena, spacing has varied with the land use density with the primary purpose of the collector streets providing connections between the residential areas and the arterial system. As future streets develop in the growing residential areas, it is highly recommended that local government and planning agencies review all developments to insure a collector system that can be well integrated into the major arterial system.

Listed in Table IV-1, Classification of Street Mileage, are the guideline ranges of the National Highway Functional Classification Study Manual regarding street use in urban areas, as well as mileages and percentages within the city of Helena. The table indicates that in most types of the streets, the classification is within the guideline range. It should be noted that the principal arterial systems largely consists of extensions of rural arterials into and through the area.

1970 HELENA URBAN TRANSPORTATION STUDY

LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- INTERSTATE
- PRINCIPAL ARTERIALS
- MINOR ARTERIALS
- COLLECTORS

EXISTING STREET USE

Fig. IV-1

Table IV-1

CLASSIFICATION OF STREET MILEAGE

TYPE OF STREET	STUDY GUIDELINES* PERCENT OF TOTAL MILES	STUDY GUIDELINES* ALLOWABLE MILEAGE	CITY OF HELENA PERCENT OF TOTAL MILES	CITY OF HELENA CLASSIFIED MILEAGE
Principal Arterial	5-10	7.2-14.3	7.1	10.24
Principal Arterial Plus Minor Arterials	15-25	21.5-35.8	11.5	16.44
Collectors	5-10	7.2-14.3	9.3	13.34
Local Streets	65-80	93.1-114.6	72.1	113.50
TOTALS	100.0	143.28	100.0	143.28

*1968 National Highway Functional Classification Study Manual

Principal and minor arterials consisting of 16.44 miles have been tabulated in Table IV-2. Also, shown in the same table are the collector streets totaling 13.34 miles. There are approximately 113.5 miles of local streets making a grand total of 143.28 miles in the city street network.

The principal and minor arterials outside the city of Helena in the study area consists of approximately 14.25 miles of Interstate, Federal Aid Primary and Federal Aid Secondary highways. There are also approximately 5.86 miles of collector roads and streets and 39.82 miles of local roads and streets making a grand total of 203.21 miles within the study area network. Figure IV-1 indicates the existing road and street use in the study area.

Subsequent portions of this chapter evaluate the existing system in relation to travel time, accidents, capacities, traffic volumes and public transit. In the chapter, Recommended Transportation Plan,

recommendations are made concerning proposed improvements to the existing street system in order to provide a transportation system that will satisfactorily serve 1990 traffic. As the recommended improvements are effected and as other changes in the street system occur, travel patterns will change, causing the functional classification of the affected streets to also change. These changing features will be taken into account in the continuing phase of this transportation study.

Table IV-2

CLASSIFICATION OF ROAD AND STREET MILEAGE
WITHIN THE STUDY AREA*

STREET CLASSIFICATION	MILES WITHIN CITY LIMITS	MILES OUTSIDE CITY LIMITS BUT WITHIN STUDY AREA	MILES WITHIN STUDY AREA
Interstate	1.79	6.06	7.85
Principal Arterials	8.45	4.03	12.48
Minor Arterials	6.20	4.16	10.36
SUBTOTAL ARTERIALS	16.44	14.25	30.69
Collector Street	13.34	5.86	19.20
SUBTOTAL ARTERIALS & COLLECTORS	29.78	20.11	49.89
Local Streets	113.50	39.82	153.32
TOTAL CLASSIFIED SYSTEM	143.28	59.93	203.21

*1968 Functional Classification System Miles for the Helena Urban Transportation Study Area

Table IV-3

Existing Street Use Tabulation

MAJOR ARTERIAL NETWORK WITHIN HELENA CITY LIMITS

ROUTE NO.	STREET NAME	LENGTH (Miles)
Principal Arterials		
I-15	Interstate I-15	1.79
FAP 8	Euclid Avenue	1.11
FAP 8	Lyndale Avenue	0.98
FAP 8	Montana Avenue	0.58
FAP 8	11th Avenue	1.00
FAP 8	Prospect Avenue	1.00
FAU 5805	Benton & Neill Avenue	0.47
FAU 5812	11th Avenue	0.80
FAU 5807	Main Street	1.27
FAU 5807	Cedar Street	0.55
FAU 5809	Montana Avenue	0.55
	SUBTOTAL	10.10
Minor Arterials		
Local	Last Chance Gulch	0.68
FAU 5805	Park Avenue	1.05
FAU 5805	Park Avenue	0.62
Local	Helena Avenue	0.80
FAU 5809	Montana Avenue	0.58
FAU 5816	Broadway	1.55
FAU 5813	Lamborn	0.55
FAU 5811	Montana Avenue	0.43
	SUBTOTAL	6.26
	TOTAL ARTERIALS	16.36

Table IV-3A

Existing Street Use Tabulation

COLLECTOR STREET NETWORK WITHIN HELENA CITY LIMITS

ROUTE NO. Collector Streets	STREET NAME	LENGTH (Miles)
FAU 5811	Montana Avenue	0.18
Local	Winnie Avenue	1.00
Local	California	0.36
Local	6th Avenue	1.84
FAU 5813	Lamborn	1.09
Local	Rodney	0.91
Local	Boulder	0.53
FAU 5807 & Local	Airport Road	0.89
Local	Lawrence	0.13
Local	Madison Avenue	0.43
Local	Knight	1.00
Local	Benton Avenue	1.15
Local	Laurel	0.17
Local	Hollins Avenue	1.00
Local	Henderson Avenue	1.09
FAU 5802	Custer Avenue	3.47
	SUBTOTAL	15.27
	GRAND TOTAL (Arterials & Collectors)	31.63

Source: 1968 National Highway Functional Classification Study for Montana

CAPACITY STUDY

The investigation of the traffic carrying ability, or capacity, of the various streets that comprise a street system is one of the most informative of the several studies performed in the evaluation of existing transportation facilities. The presence or absence of traffic congestion on a street is indicative of the street's ability to effectively handle the traffic using it and furnishes a measure of the level of service that the street is providing. Knowledge concerning the ability of those facilities which comprise a street network to serve volumes of traffic using them, therefore, is basic to the determination of the overall level of service being afforded by the network.

Street capacity involves many factors; however, the principal determinants are as follows:

Physical and operating conditions:

- Width of approach
- One-way or two-way operation
- Parking conditions

Environmental conditions:

- Load factor
- Peak-hour factor
- Metropolitan area population
- Local within metropolitan area

Traffic characteristics:

- Turning movements
- Trucks and through buses
- Local transit buses

Control measures:

- Traffic signals
- Marking of approach lanes

"Capacity", as defined in the 1965 Highway Capacity Manual, is the maximum number of vehicles that can pass a given point on a lane or roadway during one hour under prevailing roadway, traffic and ambient conditions.

Several "Levels of Service" ranging from "A" through "F" have been defined in the Capacity Manual in an attempt to present a ratio of traffic volume to capacity, expressed in terms of driver satisfaction. With "Level of Service A", a condition of free-flow with low volumes and legal speeds exist. At "Level of Service B", the flow is stable with operating speeds beginning to be restricted somewhat by traffic conditions; however, drivers still have reasonable freedom to select their speed and lane of operation.

Stable flow is still provided at "Level of Service C"; however, speeds and maneuverability are more closely controlled by higher volumes. Occasionally drivers may have to wait through more than one red signal indication, and backups may develop behind turning vehicles. In the absence of local conditions dictating otherwise, this is the level typically associated with urban design practice and was the criteria used in this study for determining satisfactory performance of approaches to intersections.

"Level of Service D" approaches unstable flow with drivers having little freedom to maneuver, and comfort and convenience are low. At "Level of Service E", capacity is reached. Flow is unstable and accompanied by long lines of vehicles waiting upstream of the intersections, with delays probably being up to several signal cycles in length. With "Level of Service F", a jammed or forced flow condition exists.

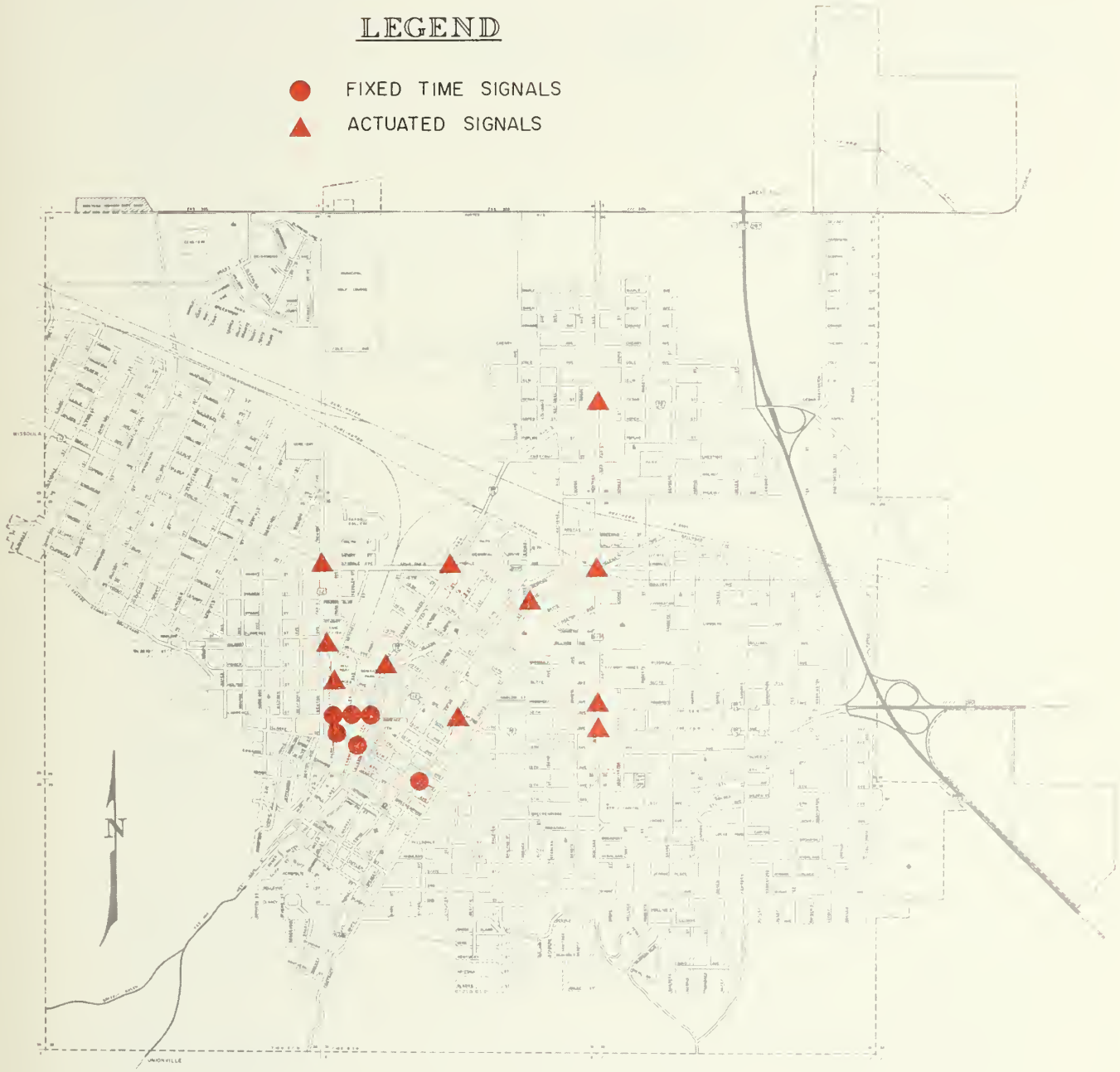
The greatest restriction in urban areas to normal traffic flow is

1970 HELENA URBAN TRANSPORATION STUDY

LEGEND

FIXED TIME SIGNALS

ACTUATED SIGNALS



SIGNALIZED INTERSECTIONS

Fig. IV-2

usually found at signalized intersections, of which there are 18 in Helena. These signal locations are indicated in Figure IV-2. Flasher signals used in school areas are not included. Basically, capacity of signalized intersections establish the overall capacity of each street. Exceptions to the rule might be caused by mid-block congestion, which sometimes prevents the signalized intersections from operating at their full capacity.

Based on the factors listed in the initial paragraph, the major street system in Helena has been analyzed with a view of determining where the most critical areas of congestion or restriction are occurring on the major street system.

Initially, each approach to the 17 signalized intersections in the city was manually counted during the weekday a.m., noon, and p.m. peaks to determine the existing peak hour traffic volumes, as well as turning movements and percentage of commercial vehicles. The counts were conducted from 7:00 a.m. to 9:00 a.m., 11:00 a.m. to 2:00 p.m. and 4:00 p.m. to 6:00 p.m. Generally, the highest peak hour traffic count and the highest fifteen minute count in that period was used for analy Intersection approaches with their respective volume/capacity ratios for the highest volume intersections are shown in Table IV-4. The directional approaches to each intersection were considered separately in computing the theoretical street carrying capacity at "Level of Service E". Also taken into account in the determination were such factors as separate turning lanes with or without separate signal controls and the absence of separate turning lanes. The level of service of each approach is also indicated in Table IV-4.

Theoretical intersection approach capacity determinations were based on methods, factors and tables found in Chapter VI of the 1965

Table IV-4

Major Intersection Approaches

PEAK HOUR V/C AND LEVEL OF SERVICE

	HOURLY CAPACITY	PEAK HOUR VOLUME	VOLUME CAPACITY RATIO	LEVEL OF SERVICE
Montana-Cedar				
Montana-North	540	275	.51	A
Montana-South	605	250	.41	A
Cedar-East	815	240	.30	A
Cedar-West	1,170	320	.25	A
Montana-Lyndale-Helena				
Montana-North	330	345	1.04	E
Montana-South	720	565	.78	C
Lyndale-West	615	385	.63	
Helena-Northeast	385	175	.45	
Helena-Southwest	385	205	.54	
Montana-Prospect				
Montana-North	990	630	.64	B
Montana-South	1,035	330	.32	A
Prospect-East	800	735	.92	E
Prospect-West	400	4	.01	A
Montana-11th Avenue				
Montana-North	1,580	1,020	.66	B
Montana-South	925	520	.56	A
11th Avenue-West	405	405	1.00	E
Benton-Lyndale-Euclid				
Benton-North	700	280	.40	A
Benton-South	700	490	.70	B
Lyndale-East	1,190	720	.61	B
Euclid-West	1,200	550	.46	A
Last Chance-Lyndale				
Last Chance-North	585	350	.60	B
Last Chance-South	725	500	.69	B
Lyndale-East	600	500	.83	D
Lyndale-West	525	695	1.32	E
Fuller-Lawrence				
Fuller-North	340	225	.66	B
Fuller-South	335	160	.48	A
Lawrence-East	440	260	.59	A
Lawrence-West	470	200	.43	A
Last Chance-Helena-Neill				
Last Chance-North	375	335	.89	D
Last Chance-South	250	301	1.20	E
Helena-East	475	405	.88	D
Neill-West	430	725	1.68	E

Table IV-4 Continued

	HOURLY CAPACITY	PEAK HOUR VOLUME	VOLUME CAPACITY RATIO	LEVEL OF SERVICE
Last Chance-Lawrence				
Last Chance-North	935	645	.70	B
Lawrence-East	460	145	.32	A
Lawrence-West	460	265	.58	A
Last Chance-6th Avenue				
Last Chance-North	1,015	620	.61	B
6th Avenue-East	330	280	.85	D
6th Avenue-West	350	185	.53	A
Park-Benton-Neill				
Benton-North	870	520	.60	B
Park-South	1,210	895	.73	C
Neill-East	980	345	.35	A
Park-Lawrence				
Park-South	880	595	.67	B
Lawrence-East	390	280	.72	C
Lawrence-West	420	170	.40	A
Park-6th Avenue				
Park-South	1,000	530	.53	A
6th Avenue-East	440	235	.53	A
Rodney-6th Avenue				
Rodney-North	360	206	.57	A
Rodney-South	400	219	.55	A
6th Avenue-East	580	193	.33	A
6th Avenue-West	500	210	.42	A
Rodney-11th Avenue				
Rodney-North	340	131	.39	A
Rodney-South	275	242	.88	C
11th Avenue-East	530	262	.49	A
11th Avenue-West	750	409	.55	A
Rodney-Helena Avenue				
Rodney-North	440	33	.08	A
Rodney-South	575	79	.14	A
Helena Avenue-East	840	346	.41	A
Helena Avenue-West	980	284	.29	A

"Highway Capacity Manual" and related nomographs developed by Mr. Jack Leisch.

All of the 17 intersections were inventoried as to physical conditions and signal timing. Where actuated signals were involved observations were made during peak hours to determine the green time versus cycle length readings.

The principal conclusion reached is that the level of service of the major street system in Helena is generally above accepted standards insofar as traffic carrying ability is concerned. Table IV-5 indicates there are 11 capacity deficient intersection approaches which warrant consideration for improvement, recommendations for which are contained in Chapter VIII, "Traffic Operations Program to Improve Capacity and Safety".

"Level of Service C" has been established as a satisfactory criteria for urban design practice and Table IV-5 is based on this criteria. There are, however, additional intersection improvements that are recommended in Chapter VIII based upon safety and operational characteristics of particular intersections.

The 1990 traffic projections will form the basis for the street and highway plan and priorities for improvements shown in Chapter VII "Recommended Transportation Plan". Attention will be directed toward improving capacity deficient intersections and control sections to obtain an acceptable level of service to meet the anticipated future traffic demands.

The continuing phase of this study will also provide a means for determining unforeseen deficiencies which may arise and for planning related corrective action.

Table IV-5

CAPACITY DEFICIENT INTERSECTION APPROACHES

(Less than level of Service C)

INTERSECTION	DIRECTION of APPROACH	EXISTING LEVEL SER.	PEAK 15 MIN. APP. VOLUME	PEAK HOURLY APP. VOLUME
Montana, Lyndale, Helena Avenues	North	E	90	345
	South	C*	229	565
Montana, Prospect	East	E	220	735
Montana, 11th Avenue	West	E	126	405
Last Chance, Lyndale Ave.	East	D	209	465
	West	E	220	650
Last Chance, Neill, Helena Avenues	North	D	96	315
	South	E	74	285
	East	D	114	380
	West	E	254	680
Last Chance, 6th Ave.	East	D	93	260

*Special consideration due to unique geometrics.

TRAVEL TIME

A primary consideration of the vehicle operator in selecting a route of travel is the total time required to reach his destination. With this emphasis being placed on the value of time in our modern day society, the shorter, more direct route is quite often bypassed in favor of a longer route which affords a savings of time.

Travel time has become an essential element in analyzing the relative performance of a street network. Travel time and relative average

1970 HELENA URBAN TRANSPORTATION STUDY

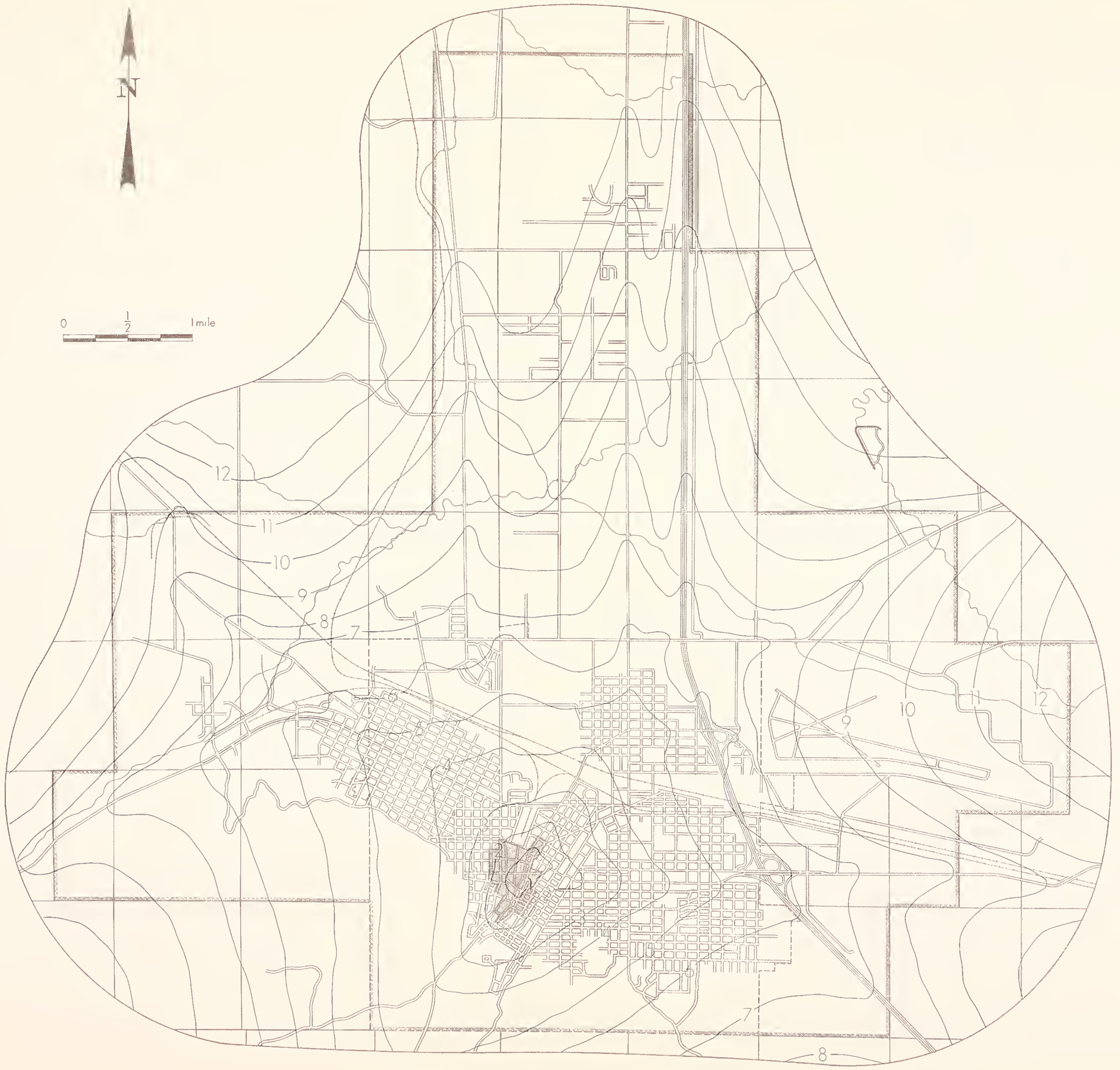
LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- UNDER 15 MPH
- 15 - 20 MPH
- 21 - 25 MPH
- 26 - 30 MPH
- OVER 31 MPH

TRAVEL SPEEDS

Fig. IV-3

1970 HELENA URBAN TRANSPORTATION STUDY



LEGEND

STUDY AREA

CENTRAL BUSINESS DISTRICT

~1~ AVERAGE TRAVEL TIME IN MINUTES

AVERAGE TRAVEL TIME

Fig. IV-4

speed are indicators of the existing degree of congestion and level of service being afforded to the motorist along a particular route. This study was made to determine the time required to travel between selected points within the study limits and simultaneously to obtain average speeds and to record delay times involved.

Actual speeds and delays were recorded by a driver and observer along each of the various routes studied. The driver kept pace with the general stream of traffic, irrespective of the posted speed limit. Where dispersion or relative absence of traffic existed, the posted speed limits were observed.

Each route was driven a minimum of two times in each direction during off-peak traffic hours and at least twice during peak traffic hours. The results were then checked and if unusual variations in travel or delays were encountered, additional trips were made to resolve the variations.

Table IV-6 indicates that the lowest average speeds recorded were within the CBD, ranging from 5 to 13 miles per hour during peak hours. Considering that no signal progression exists, and there are some parking and pedestrian interferences, these are not unreasonably low speeds. Improvement in average speeds will undoubtedly be attained in the CBD with the completion of urban renewal plans.

Figure IV-3 reflects average driving speeds obtained during peak hours of traffic on the various streets. This figure includes and supplements in graphic form the data tabulated in Table IV-6.

The isochronal map depicted by Figure IV-4 illustrates the average travel times required to travel from the intersection of Lawrence Street and Last Chance Gulch, in the CBD, to various other points within the study area. Travel time outside the city limits on some of the select

routes was based on average highway speeds. The chart indicates that travel times are comparable in most directions of travel from the CBD within the city limits. Outside the city limits and within the study area the interstate and rural arterials indicate the greatest efficiency.

The criteria established by the National Council on Urban Transportation for measuring the overall efficiency of a street system indicates that the travel times in Helena are within the desirable limits. This is illustrated in Figure IV-4 where the minimum travel time for the two mile range falls below the seven minute time line.

Table IV-6

COMPARISON OF PEAK HOUR AND OFF-PEAK HOUR RUNS

TRAVEL TIME AND AVERAGE SPEED

ROUTE	FROM	TO	MILES	AVG. TRAVEL TIME MIN. PEAK	AVG. TRAVEL TIME MIN. OFF-PEAK	AVG. SPEED MPH PEAK	AVG. SPEED MPH OFF-PEAK
Euclid & Lyndale Ave.	FAS 356	Helena Ave.	3.36	7.34	6.90	28	29
Montana Ave.	Helena Ave.	Winnie	1.14	3.60	3.31	19	22
Montana Ave.	Helena Ave.	Sierra Drive	4.34	8.80	7.09	30	35
I-15	Capitol Interchange	Cedar St. Interchg.	1.38	4.17	4.03	36	37
Custer Ave.	Henderson St.	I-15 Frontage Road	2.25	3.85	3.65	36	38
Helena Ave.	Last Chance Gulch	Montana Ave.	0.81	2.66	2.45	18	20
Broadway	Last Chance Gulch	Rodney St.	0.22	0.93	0.82	14	16
Broadway	Rodney St.	Montana Avenue	0.72	2.45	2.27	18	21
Broadway	Montana Ave.	Lamborn St.	0.54	1.50	1.49	21	22
Winnie Ave.	Montana Ave.	Lamborn St.	0.52	1.48	1.52	21	20
Lamborn St.	Winnie Ave.	Prospect Ave.	0.66	2.68	2.12	15	19
Neill Ave.	Park	Last Chance Gulch	0.26	1.44	0.83	13	19
11th Ave.	Last Chance Gulch	Rodney St.	0.34	1.85	1.33	11	16
11th Ave.	Rodney St.	Montana Ave.	0.51	1.90	1.19	17	18

Table IV-6 Continued

COMPARISON OF PEAK HOUR AND OFF-PEAK HOUR RUNS

TRAVEL TIME AND AVERAGE SPEED

ROUTE	FROM	TO	MILES	AVG. TRAVEL TIME MIN. PEAK	AVG. TRAVEL TIME MIN. OFF-PEAK	AVG. SPEED MPH PEAK	AVG. SPEED MPH OFF-PEAK
11th Ave.	Montana Ave.	Capitol Intchg.	1.12	2.45	2.41	33	34
Prospect Ave.	Capitol Interchange	Montana Ave.	0.86	1.81	1.59	30	33
Cedar St.	Cedar St. Interchg.	Montana Ave.	0.75	0.63	0.62	37	37
Last Chance Gulch	Montana Ave.	Lyndale Ave.	0.86	0.87	0.87	31	32
Last Chance Gulch	Lyndale Ave.	Neill Ave.	0.41	2.30	1.49	11	17
Last Chance Gulch*	Neill Ave.	Lawrence St.	0.18	1.21	0.77	9	15
Last Chance Gulch*	Lawrence St.	6th Ave.	0.12	1.49	0.60	5	12
Last Chance Gulch*	6th Ave.	Broadway	0.14	0.66	0.52	13	16
Last Chance Gulch*	Broadway	Cutler	0.23	0.68	0.69	19	18
Park Ave.*	Cutler	Lawrence St.	0.45	1.39	1.61	19	17
Park Ave.*	Lawrence St.	Neill Ave.	0.25	1.09	1.07	14	14
Benton Ave.	Neill Ave.	Euclid Ave.	0.27	1.05	0.95	16	17
Benton Ave.	Euclid Ave.	Peosta Ave.	0.27	1.14	0.72	15	24
Benton Ave.	Peosta Ave.	Custer Ave.	0.98	1.06	1.05	28	29

Table IV-6 Continued

COMPARISON OF PEAK HOUR AND OFF-PEAK HOUR RUNS

TRAVEL TIME AND AVERAGE SPEED

ROUTE	FROM	TO	MILES	AVG. TRAVEL TIME MIN. PEAK	AVG. TRAVEL TIME MIN. OFF-PEAK	AVG. SPEED MPH PEAK	AVG. SPEED MPH OFF-PEAK
6th Ave.	Park Ave.	Last Chance Gulch	0.10	0.89	0.75	7	8
6th Ave.	Last Chance Gulch	Rodney St.	0.25	0.55	0.46	12	17
6th Ave.	Rodney St.	Montana Ave.	0.63	1.92	1.89	20	20
6th Ave.	Montana Ave.	Lamborn St.	0.53	1.34	0.89	13	17
Fuller Ave.	Neill Ave.	Lawrence St.	0.22	1.22	0.50	13	14
Fuller Ave.	Lawrence St.	6th Ave.	0.09	0.98	0.69	6	8
Lawrence St.	11th Ave.	Last Chance Gulch	0.22	0.50	0.47	14	15
Lawrence St.	Last Chance Gulch	Fuller Ave.	0.06	0.45	0.42	8	9
Lawrence St.	Fuller Ave.	Park Ave.	0.06	0.68	0.45	5	8
State St.	Park Ave.	Last Chance Gulch	0.05	0.28	0.26	11	12
State St.	Last Chance Gulch	Rodney St.	0.26	0.76	0.79	21	19
Rodney St.	State St.	Broadway	0.19	0.77	0.67	16	17
Rodney St.	Broadway	6th Ave.	0.15	0.71	0.74	13	13
Rodney St.	6th Avenue	11th Ave.	0.26	0.99	0.82	16	19
Rodney St.	11th Ave.	Helena Ave.	0.48	1.54	1.44	19	20

Table IV-6 Continued

COMPARISON OF PEAK HOUR AND OFF-PEAK HOUR RUNS

TRAVEL TIME AND AVERAGE SPEED

ROUTE	FROM	TO	MILES	AVG. TRAVEL TIME MIN. PEAK	AVG. TRAVEL TIME MIN. OFF-PEAK	AVG. SPEED MPH PEAK	AVG. SPEED MPH OFF-PEAK
Rodney St.	11th Ave.	Helena Ave.	0.48	1.54	1.44	19	20
Rodney St.	Helena Ave.	Lyndale Ave.	0.12	0.68	0.59	11	12
Custer Ave.	Henderson St.	Benton Ave.	0.61	1.03	0.50	36	37
Custer Ave.	Benton Ave.	Montana Ave.	0.99	0.87	0.82	37	37
Hauser Blvd	Benton Ave.	Henderson St.	0.83	1.23	1.04	20	23
Peosta Ave.	Benton Ave.	Henderson St.	0.63	1.76		21	
Henderson St.	Custer Ave.	Peosta Ave.	0.72	0.96	0.75	22	28
Henderson St.	Peosta Ave.	Euclid Ave.	0.25	0.85	0.72	18	21
Henderson St.	Euclid Ave.	Hauser Blvd.	0.22	1.04	0.83	13	16

*One-way

ACCIDENT STUDY

No analysis of a city's street system would be complete without a comprehensive review of the incidence of traffic accidents, their locations and the contributing causes. The relative absence or occurence of accidents at intersections and along sections of a street is another measure of the level of service being provided by a facility.

The purpose of this study is to identify high accident locations and attempt to determine contributing causes. Planning improvements to reduce the frequency of accidents are discussed here and in Chapter VIII, "Traffic Operations Plan to Increase Capacity and Safety".

During the three year period 1969-71, the total number of persons injured as a result of accidents in Helena was 354. Fatalities during the same period amounted to one. Further data showing total number and type of accidents reported in Helena for the three year period are indicated in Figure IV-5. Another chart shown in Figure IV-5 characterizes accident trends by months of the year for the same period. Figure IV-6 indicates the number of accidents occurring by hour of the day for the year 1971. Accident records for this analysis were furnished by the Helena Police Department.

An all-accident rate was determined for each segment of the study system. In using the ten million vehicle mile basis, assumption is made that the traffic accident exposure is directly related to the vehicle miles of travel. Accident rates, as indicated in Figure IV-7, are a fairly accurate measure of the relative degree of hazard; however, sometimes low traffic volumes create high values and tend to magnify the significance of a few accidents. Conversely, the accidents per mile basis may show low values since only the number of accidents and length of streets are considered.

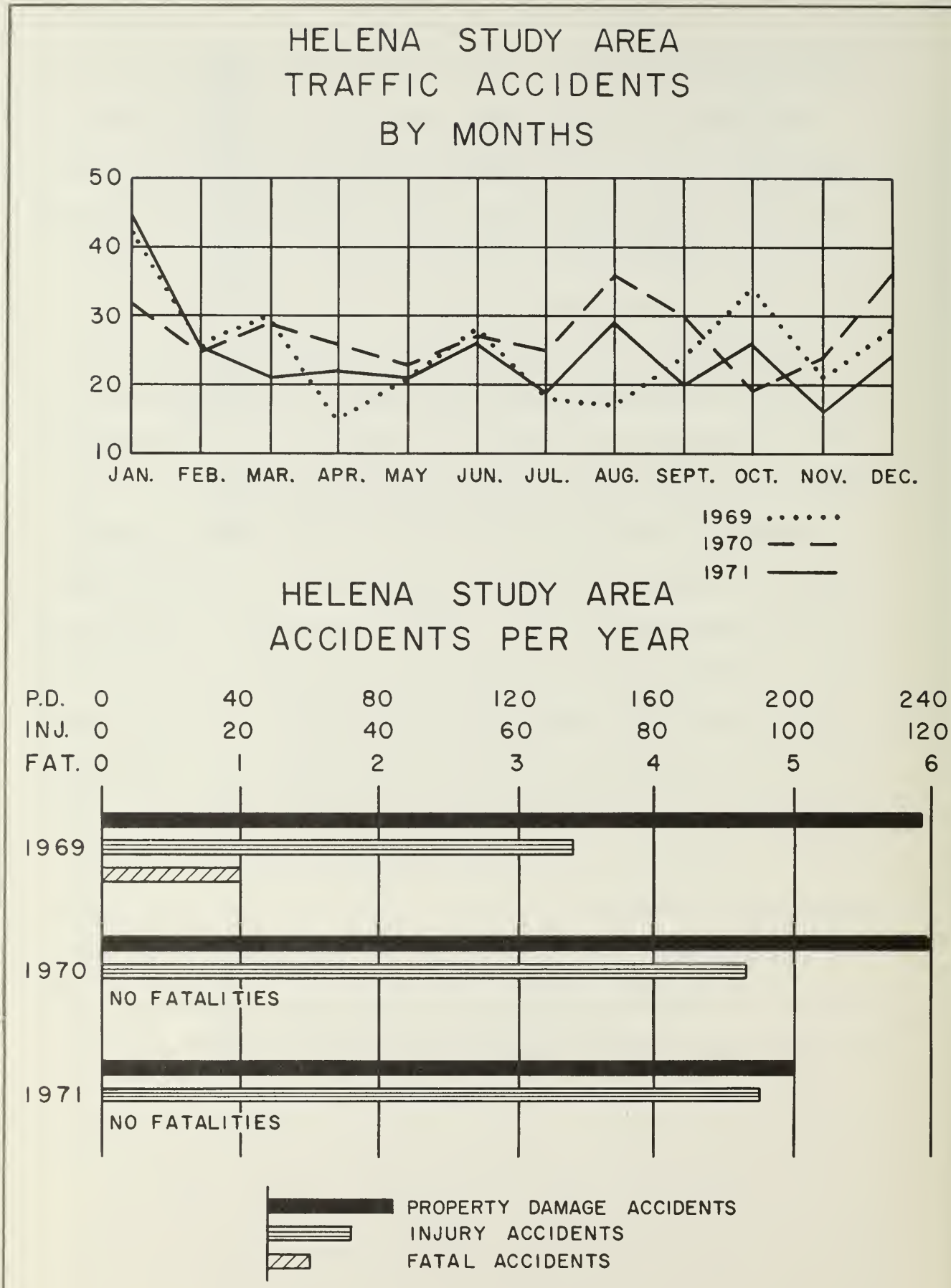

HELENA STUDY AREA
TRAFFIC ACCIDENTS
BY MONTHS
50
40
30
20
10
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
1969
1970
1971
HELENA STUDY AREA
ACCIDENTS PER YEAR
P.D. 0 40 80 120 160 200 240
INJ. 0 20 40 60 80 100 120
FAT. 0 1 2 3 4 5 6
1969
1970
NO FATALITIES
1971
NO FATALITIES
PROPERTY DAMAGE ACCIDENTS
INJURY ACCIDENTS
FATAL ACCIDENTS

Fig. IV-5

HELENA STUDY AREA
ACCIDENTS BY HOUR OF DAY
1971

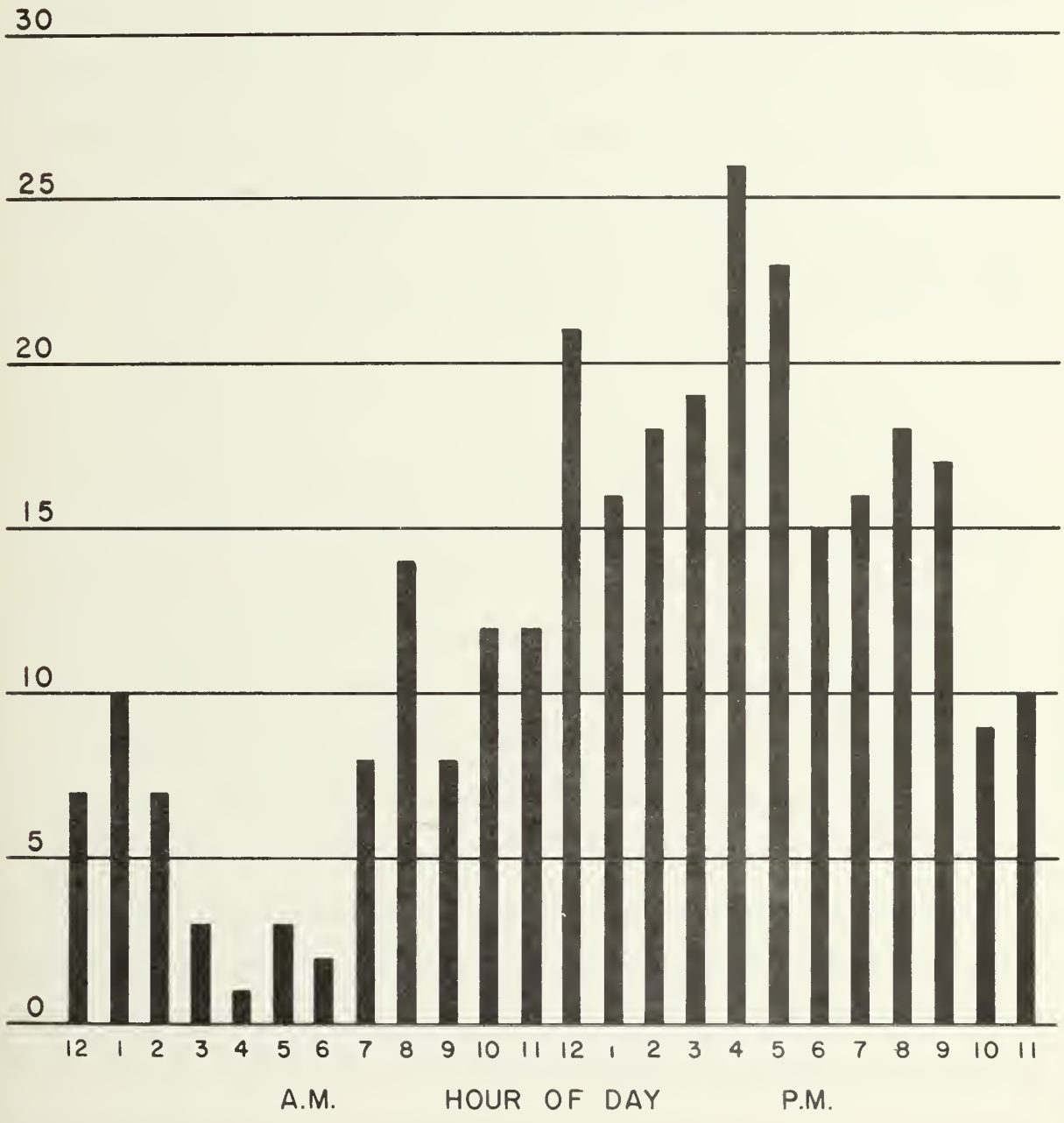


Fig. IV-6

The study has identified the higher accident intersections in the city. Table IV-7 provides a list of 23 intersections having a high number of accidents and as would be expected, the highest accident intersections are located along the major highway routes where the highest traffic volumes are experienced. Only three of the listed intersections are off the Federal Aid Primary and Secondary routes.

High accident locations outside the city limits of Helena but within the study area are summarized in Table IV-8. This data was collected for the same three year period from the Montana Highway Patrol records.

Some proposed measures and principles of design intended to minimize accidents in the future are discussed in Chapter VIII, "Traffic Operations Plan to Increase Capacity and Safety".

TRAFFIC VOLUMES

Traffic volumes and volume trends are basic data necessary to almost any study relative to transportation facilities. Many of the other analyses related to the existing system such as capacity, level of service, travel time and accident information are interdependent on existing traffic volumes. From the past and present traffic indications, a basis for comparison is established and significant trends usually emerge. Both of these factors are vital to planning for future needs.

Traffic volumes on major streets and roads within the study area were obtained by machine at approximately 125 locations during August of 1969. A permanent counter, located on Montana provided the historic trends indicated in Table IV-9. Traffic at this location has doubled in the past fourteen years from 1958 to 1971.

Table IV-7

HIGH ACCIDENT INTERSECTIONS WITHIN CITY OF HELENA

(1969-1971)

INTERSECTION	FATAL	INJURY	PROPERTY DAMAGE	TOTAL
Montana & Boulder	0	5	24	29
Euclid & Benton	0	5	23	28
Montana & 11th	0	6	13	19
Montana & Prospect	0	9	9	18
Montana & Cedar	0	4	14	18
Last Chance Gulch & Lawrence	0	4	14	18
Park & Lawrence	0	6	11	17
Last Chance Gulch & Lyndale	0	6	10	16
Roberts & 11th	0	3	13	16
Prospect & Lamborn	0	5	9	14
Fee & 11th	0	6	7	13
Montana & Billings	0	5	8	13
Park & Placer	0	2	11	13
Benton, Neill, Park	0	3	10	13
Rodney & Helena	0	3	9	12
Last Chance Gulch, Helena, Neill	0	3	8	11
Montana, Helena, Lyndale	0	2	9	11
Benton & Hauser	0	2	8	10
Neill & Getchell	0	2	8	10
Park & 6th	0	2	8	10
Lamborn & 11th	0	2	8	10
Rodney & 6th	0	1	9	10
Neill & Front	0	0	10	10

Table IV-8

HIGH ACCIDENT SECTIONS OUTSIDE CITY OF HELENA WITHIN STUDY AREA

(1969-1971)

SECTION HIGHWAY	FROM	TO	FATAL	INJURY	PROP. DAMAGE	TOTAL
U.S. 12	Helena W CL	Study Bndry	1	14	22	37
U.S. 12	Helena E CL	Study Bndry	1	13	22	36
U.S. 91	Helena N CL	Study Bndry	2	14	23	39
I-15	Helena S CL	Study Bndry	-	4	2	6
I-15	Helena N CL	Study Bndry	2	7	2	11
FAS 280	Jct. U.S. 91	Study Bndry	-	8	7	15
FAS 356	Jct. U.S. 12	Study Bndry	-	7	5	12

1970 HELENA URBAN TRANSPORTATION STUDY

LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- UNDER 160
- 161 - 300
- 301-500
- OVER 500

AVERAGE ACCIDENT RATE FOR STUDY SYSTEM IS EQUAL TO 160 PER TEN MILLION VEHICLE MILES.

ACCIDENT RATES

Fig. IV-7

1970 HELENA URBAN TRANSPORTATION STUDY

N

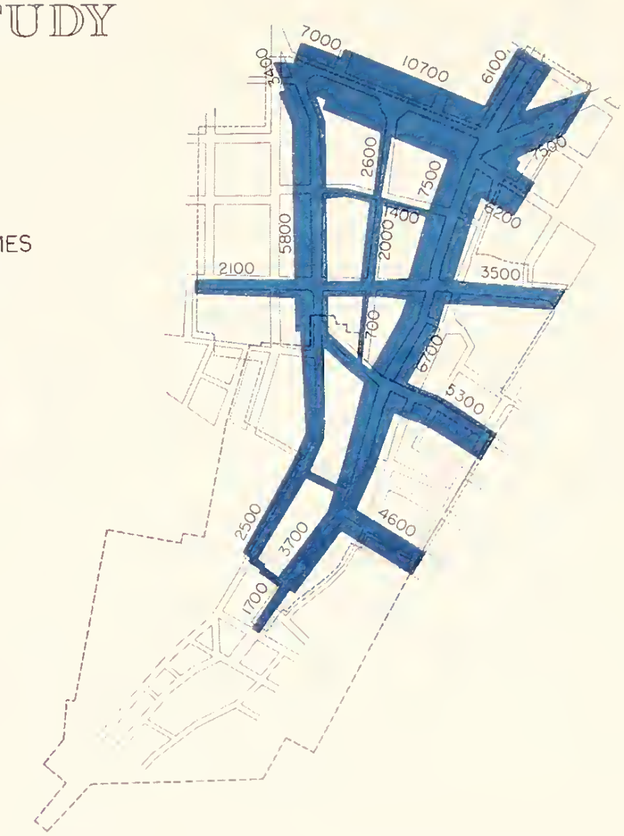
0 ½ 1 mile

TRAFFIC VOLUMES FOR INSET

2,500

5,000

10,000



LEGEND

STUDY AREA

CENTRAL BUSINESS DISTRICT

5,000

10,000

20,000

TRAFFIC VOLUMES

1969 TRAFFIC VOLUMES

Fig. IV-8

Table IV-9

AVERAGE DAILY TRAFFIC

Permanent counter location on Montana Avenue

YEAR	ADT	PERCENT INCREASE*
1958	7,539	13.6
1959	7,601	0.8
1960	7,833	3.1
1961	7,971	1.8
1962	8,263	3.7
1963	8,371	1.3
1964	9,664	15.4
1965	10,702	10.7
1966	10,858	1.4
1967	11,164	2.8
1968	11,954	7.1
1969	12,625	5.6
1970	13,254	5.0
1971	13,549	2.2

* Indicates percent increase over previous year.

The above tabulation indicates volumes have increased 69 percent from 1960 to 1970, while the city has recorded a 12.4 percent population increase in the same decade. Most of the population expansion has been to the southeast and the north of the central city. The construction of residential subdivisions, shopping centers, and schools account for the high trip production in and out of these areas.

Figure IV-8 indicates the 1969 traffic volumes. The highest volume sections are on Euclid Avenue west of Benton and Montana Avenue south of Lyndale. Other areas of high volumes are Lyndale Avenue between Benton and Montana and the one way couplet of 11th Avenue and Prospect Avenue between Lamborn and Montana.

Many people in Helena experience the frustration of rush hour traffic, then return at other hours of the day to find the same streets and thoroughfares almost devoid of traffic. In the heaviest rush periods, people are mainly traveling to and from work. Travel for other purposes is not so rigidly tied to specific hours of the day and is usually more dispersed. These factors give rise to definite patterns of trip-making which are reflected in traffic counts made on an hourly basis. Table IV-10 shows the hourly count totals for a full week in July and August 1969 from the permament traffic recorder on Montana Avenue.

By analyzing the hourly weekday counts from the listing, Monday through Friday, and from three other similar weekly listings evenly spaced during the year, several observations relating to patterns of travel on Helena street thoroughfares can be made. Approximately one-half of all daily travel on an average weekday basis occurs during seven hours out of twenty-four, and one-fourth of all daily travel occurs in the three highest traffic hours.

Table IV-10

HOURLY COUNT TOTALS

MONTANA AVENUE IN HELENA

July 1969

HOUR	SUN. 27	MON. 28	TUE. 29	WED. 30	THUR. 31	FRI. 01	SAT. 02
1	233	129	154	155	166	148	348
2	269	106	114	107	76	107	227
3	122	54	31	59	55	68	147
4	61	29	22	18	19	29	69
5	28	24	26	21	25	21	37
6	42	49	30	42	58	48	57
7	79	169	154	166	163	153	106
8	123	723	762	727	707	708	217
9	197	582	575	582	581	555	358
10	345	584	574	609	610	634	664
11	553	726	733	704	700	826	883
12	706	794	806	888	906	965	1098
13	806	1227	1311	1227	1267	1299	1178
14	862	896	950	982	991	1026	780
15	762	872	879	865	919	1030	1278
16	752	940	857	869	995	1082	1179
17	735	1123	1092	1109	1124	1243	1069
18	738	1128	1188	1242	1244	1359	941
19	593	773	788	826	844	1021	914
20	687	739	853	905	1004	1017	859
21	734	861	852	960	999	948	686
22	683	712	789	753	788	770	682
23	483	487	530	464	566	580	618
24	288	234	335	283	304	571	673
	10881	13961	14405	14563	15111	16208	15068

HELENA STUDY AREA
AVERAGE WEEKDAY TRAFFIC
BY MONTHS

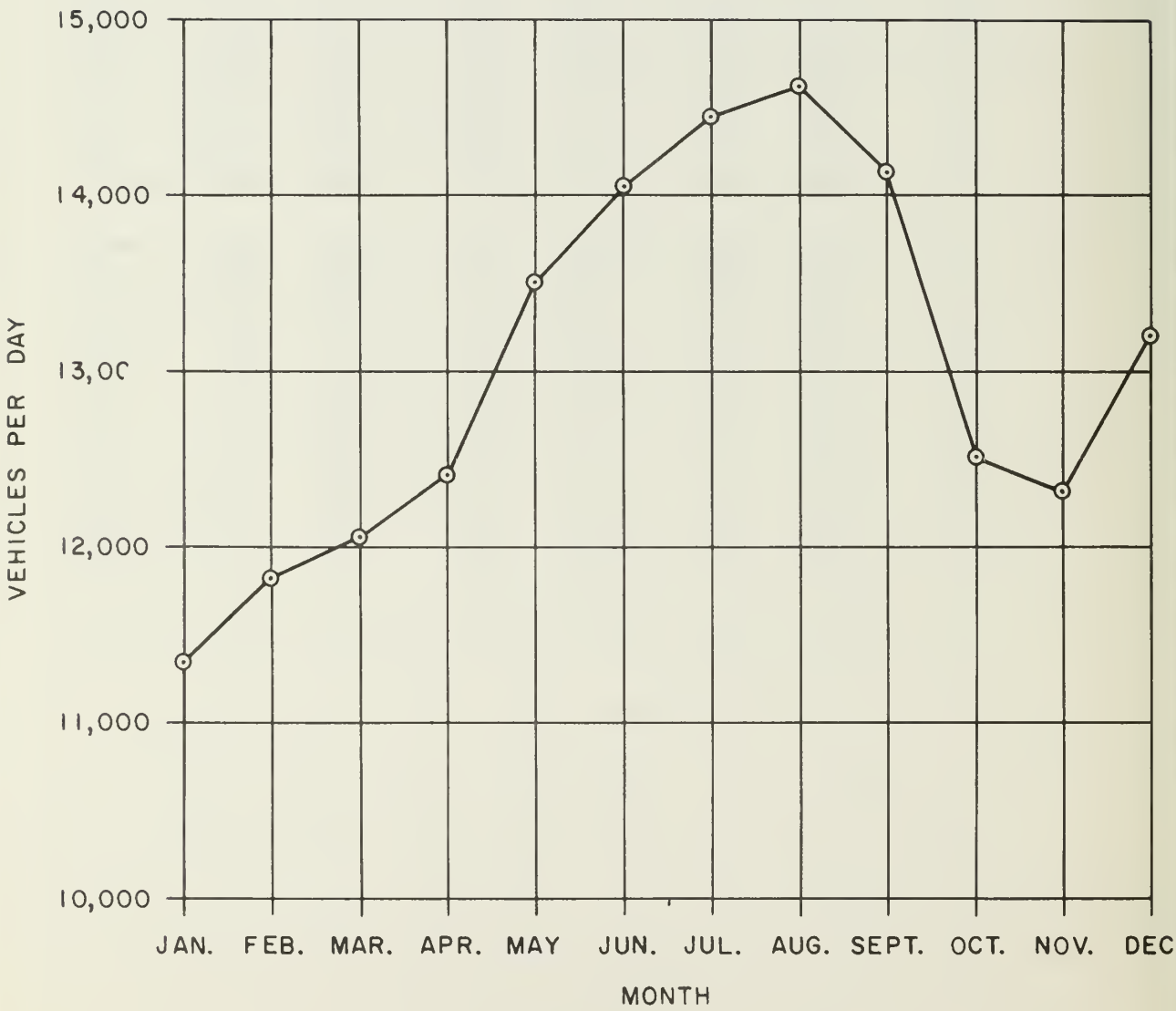


Fig. IV-9

Because of this peaking characteristic of traffic volumes on all roads and streets, it has been determined through various studies that the thirtieth highest hourly traffic volume during the year would be more reliable for highway design than average daily traffic. This thirtieth highest hour is normally expressed as a percentage of average daily traffic for the year, which for the Montana Avenue traffic recorder has been about ten per cent in recent years.

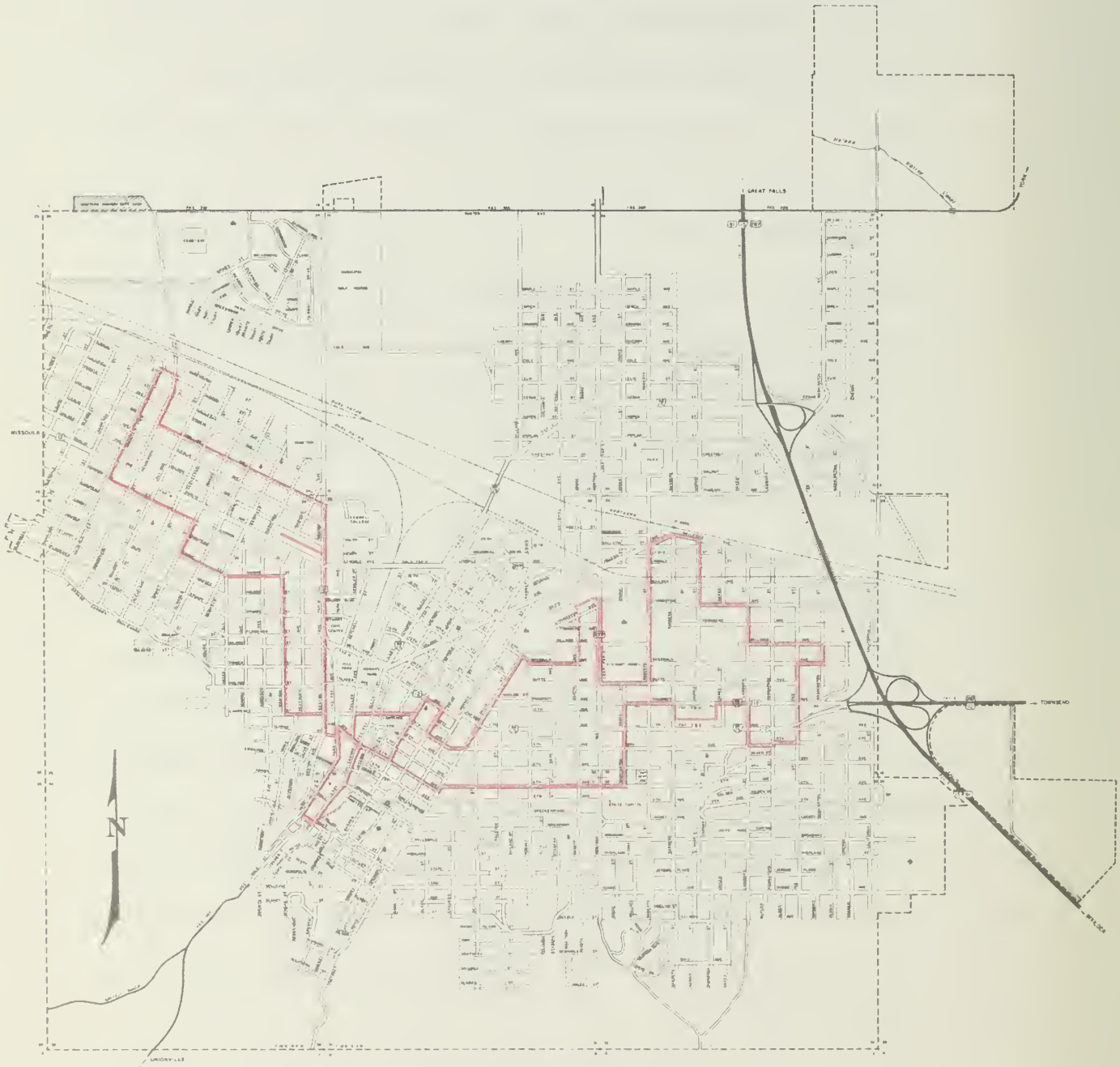
Other significant variations in traffic are worthy of consideration. Examination of Figure IV-9 indicates that daily traffic volumes vary continually throughout the year. Friday, almost without exception, is the high volume day of every week and Sunday is the low volume day. In terms of the seasonal variation of traffic, January in Montana is usually the lowest month and July or August are the highest months. Travel in the winter months is often hampered by snow, ice and poor driving conditions. Travel in the summer months is encouraged by the pleasant weather, summer school recess, vacations and the urge to see new places.

Those sections of the existing arterial and collector system that will require widening or reconstruction to accomodate the anticipated 1990 traffic volumes are indicated in Chapter VII, "Recommended Transportation Plan". Additional arterials to supplement the present system are also shown in the same chapter. Some of the inadequate sections that can be relieved by application of Traffic Engineering features are discussed in Chapter VIII.

BUS TRANSIT STUDY

Public transit had its beginning in the Helena area when the first horse drawn trolley made its maiden trip from the car barns, located on South Main Street, to the Northern Pacific depot in September 1886.

1970 HELENA URBAN TRANSPORATION STUDY



BUS ROUTES

Fig. IV-10

The streetcar lines were to flourish for the next forty years with an extensive system serving the Broadwater area, the State Fairgrounds, Fort Harrison, and East Helena, as well as the downtown and immediate residential areas.

At one time five street railway companies were operating in the area, but the end of an era was foreseen when the State registered 242 automobiles in Helena in 1913. Trolleys were officially abandoned on December 31, 1927 and, at the same time bus service was authorized by the State Public Service Commission.

Bus transit officially began in January, 1928 when four buses started serving essentially the same routes the trolleys had previously served. A motor carrier freight was also set up between Helena and East Helena. Buses continued to serve the area and hit a peak in ridership during World War II when wartime gasoline rationing curtailed the use of automobiles. In post war years, automobiles and gasoline again became plentiful and the interest in local public transit diminished. The deterioration continued until 1966 when service was terminated due to high operating costs of outmoded equipment and decreased revenue. During its tenure, the bus system was a privately owned enterprise.

When bus operations ceased, patronage was very low and objections were practically nil. Since that time, only scattered inquires or requests for renewal of transit service were received. However, in 1970 the Model Cities Department had identified a need for a transit system to create accessibility to places of work, shopping, schools and medical facilities for the senior citizens, youth and working mothers of the community. An application was submitted to U.M.T.A. for a demonstration grant.

The project has been implemented as a three year demonstration project jointly funded by Model Cities and the Department of Transportation (U.M.T.A.). The service is owned by the City of Helena and operated by a private firm. Two twenty-five passenger buses were placed in service in July, 1972 on a trial route as depicted in Figure IV-10. The route is temporary, subject to adjustment as the needs of riders are better determined. The cost of the three year project has been estimated at $173,500.

A unique feature that has been implemented along with bus transit is the "dial-a-bus" service. In order to accommodate its ridership and reach the largest percentage of potential users, the buses will deviate from their fixed routes as much as two blocks. The only requirements for this service is that the bus patron advise the company of the desired pickup at least one half-hour in advance. No additional cost to the customer is involved, the basic fare of fifty cents and forty cents in books of ten, includes this service.

Past studies have indicated that mass transit thrives best in high density residential areas and centralized commercial and industrial centers. Helena's land use trend seems to be oriented toward a wider dispersal rather than higher density. With this type of development and today's trend toward increased mobility, it is not anticipated that public transit will be a major factor in Helena's transportation system by 1990.

CHAPTER V

TERMINAL AND TRANSFER FACILITIES

Chapter V

TERMINAL AND TRANSFER FACILITIES

INTRODUCTION

In order to determine its overall effect on a transportation system an examination of the terminal and transfer facilities within a city is vitally essential to any transportation study. Basically, terminal and transfer facilities serve two functions: (1) To provide location for vehicles to terminate a trip at or reasonably near a predetermined point of destination and (2) To handle commercial operations involving the serving of passengers and/or delivery of freight and the transfer of these people and/or goods to the same or other type carriers.

It is generally accepted that the municipality has an obligation to provide leadership and overall planning guidance in the development of the parking for vehicles. Parking space for private vehicles in the CBD is of prime importance to the survival of the area. This is particularly true of the Urban Renewal area in Helena and for this reason parking studies have been made to plan and implement a parking program within the CBD.

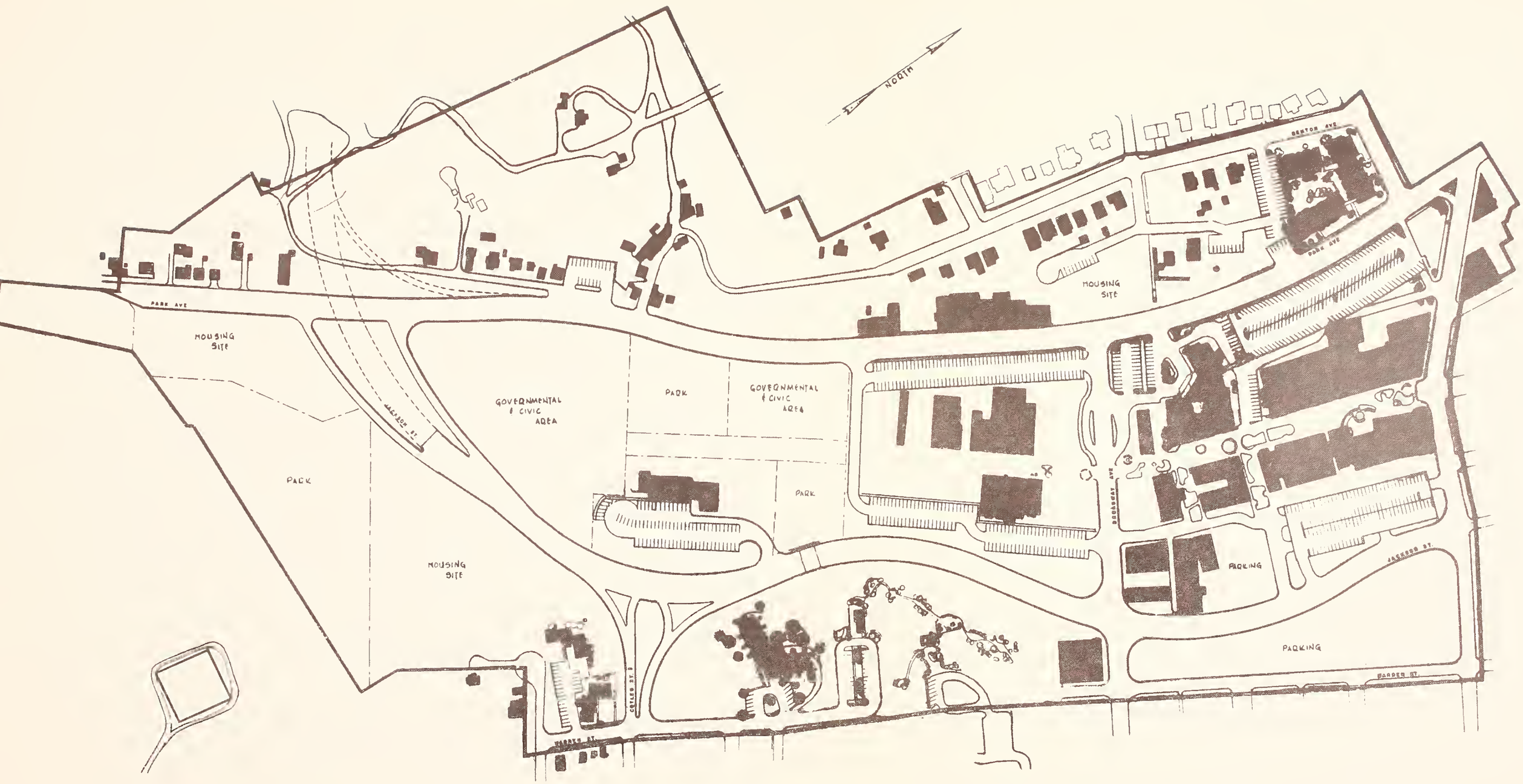
The first portion of this chapter will evaluate the present and future parking in the CBD. The second portion will deal briefly with air, bus, motor freight and railroad facilities.

1968 PARKING STUDY

In September 1968, work was started on the preparation of a parking

PRESENT PARKING IN CBD AREA

Fig. V-1



HELENA URBAN RENEWAL PLAN

Fig. V-2

plan for urban renewal projects in Helena. The study not only included the Urban Renewal Area, but the entire CBD as shown in Figure V-1. The study was prepared by the consulting firm of Clete Daily & Associates for the Urban Renewal Committee.

The initial phase of the study made basic comparisons of the status of parking in the CBD as compared to a previous study made in 1960 by the Department of Highways. Table V-1 compares the two inventories.

Table V-1

CBD CURB PARKING SPACE INVENTORY

1960 - 1968

	1960	1968	Increase	Decrease
12 Minute Meters	11	17	6	-
1 Hour Meters	306	441	135	-
2 Hour Meters	159	140	-	19
5 Hour Meters	-	87	87	-
Unrestricted	748	532	-	216
TOTAL	1,224	1,217	228	235

CBD OFFSTREET PARKING SPACE INVENTORY

1960 - 1968

	1960	1968	Increase	Decrease
Private-Restricted	294*	1,063	769	-
Public Free	144	106	-	43
Public Pay	94	215	121	-
Customer Free	416	475	59	-
TOTAL	953	1,859	949	43

* Did not include service stations, used car lots, tenant parking, etc.

Source: Traffic Circulation and Parking Study-Clete Daily & Associates-December 1968

The 1968 study also indicated that, within the CBD area, there was an overall parking space supply exceeding the actual demand by 498 spaces. However, due to the poor location of lots, with respect to the areas of demand and using 250 feet as an average walking distance, the excess 498 overall spaces were adjusted to a composite space deficiency of 318 spaces. This compared to the 1960 overall deficiency of 250 spaces for the same area.

The second phase of the study evaluated the parking plan proposed for the urban renewal project area. The parking supply was to be affected due to the creation of a mall and the realignment of the street system as indicated by Figure V-2. The proposed plan would decrease the on-street parking considerably and increase the off-street parking to not only make up for the on-street loss of space, but provide for future needs. Total number of spaces within the urban renewal area would increase as shown by Table V-2.

Table V-2

PROPOSED PARKING SPACE INCREASE

URBAN RENEWAL AREA

	Curb Spaces	Offstreet Spaces	Total Spaces
1968	259	658	917
Proposed	33	1,452	1,485
Gain/Loss	-226	+794	+568

Source: Traffic Circulation and Parking Plan - Clete Daily & Associates, June 1969

Total parking demand for the project area was estimated to be 1,564 spaces. The demand estimate was based on a floor space field survey

supplemented by plans and estimates of floor space to be added to the urban renewal project area. The study recommended that an additional eighty spaces be programmed in the area of highest deficiency, near the planned Hotel-Motel Convention facility. This would provide the needed spaces to bring the proposed 1,485 spaces, Table V-2, up to the estimated demand of 1,564 spaces.

1972 PARKING PROGRAM

As the demolition work in the urban renewal area neared completion, the city commission authorized a parking system study for the CBD area. A contract with N. G. Jacobson and Associates, Incorporated, was formalized in February 1972 and the study completed in June 1972.

The study was to encompass a review of existing downtown conditions, analysis of the parking situations, preparation of pre-schematic drawings for a parking structure and development of financial planning guidelines and the preparation of a report recommending a financing program.

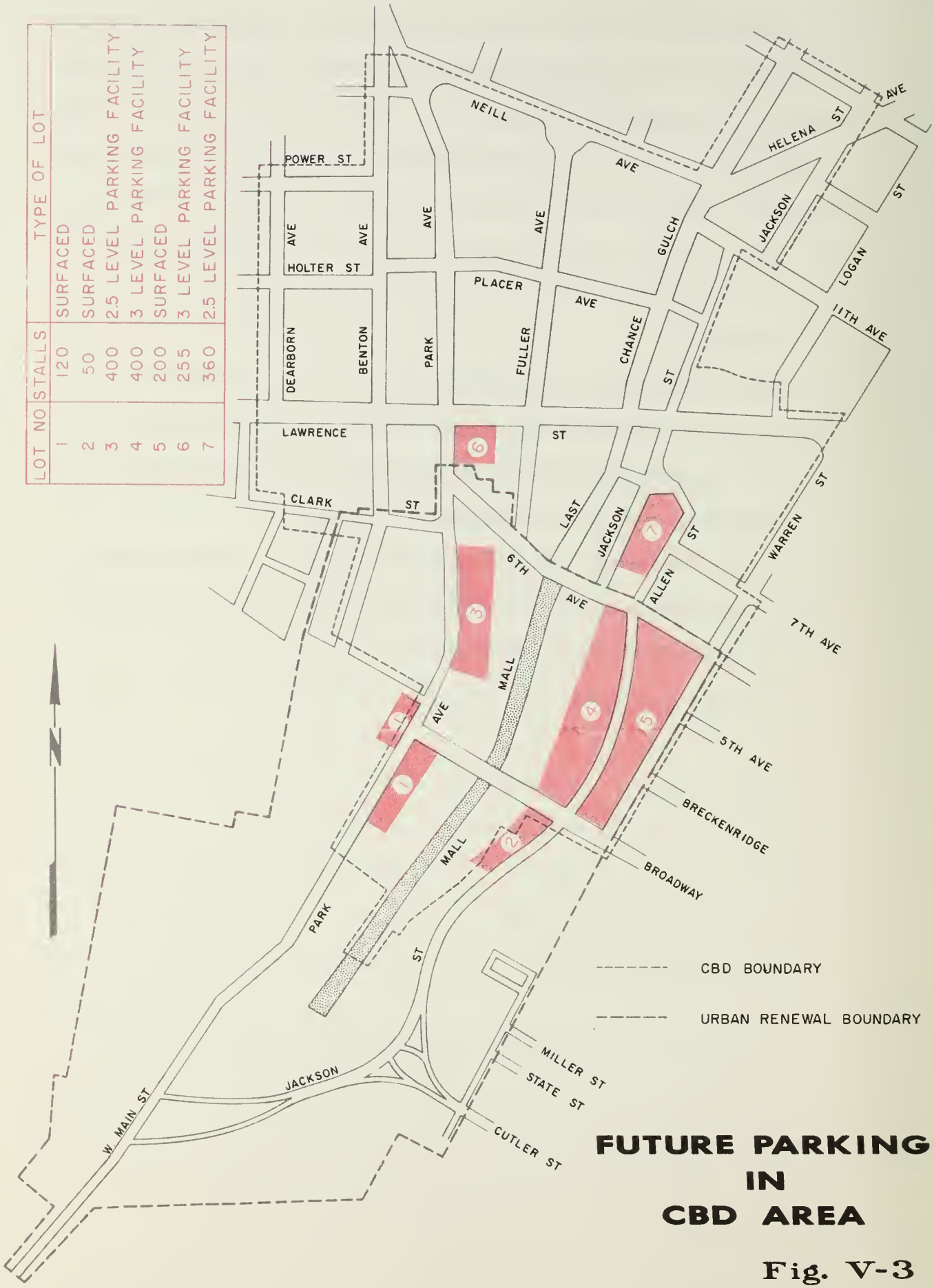
Investigations into the surplus or deficiency in parking within the area revealed findings similar to the earlier study by Clete Daily and Associates within the parking study area and an overall deficiency of 240 spaces was estimated, however, in the tighter core area bounded by Jackson/Warren, Placer and Park Avenue, a deficiency of 636 spaces was estimated.

The parking problem was attributed to several factors including (1) the generally inadequate supply, (2) the relative long walking distances, (3) the steep grades to the east and west, and (4) the unattractive and often unsurfaced lots within the CBD.

The recommended long range parking program encompasses the construction of 1,785 parking stalls within the CBD over an extended time period. The extent of the program is shown in Figure V-3. The first increment of this phased program includes 1,230 stalls in the central core area, which includes part, but not all, of the urban renewal area. The number of stalls within the urban renewal area compared with the recommended number of stalls required in the previous study by Daily and Associates.

The estimate of future parking demand for the entire CBD area was based on a block by block estimate of building usage. Estimates were by parking unit for hotels, motels, apartments and dwelling units and a square footage basis for commercial facilities.

Table V-3 shows the projections of the parking supply as developed by the recommended program. New projects are primarily a development of the urban renewal area through 1976.



FUTURE PARKING IN CBD AREA

Fig. V-3

Table V-3

CBD PARKING SUPPLY PROJECTION[1]

	1972	1973	1974	1975	197_	198_
NEW PROJECTS HOTEL I BROADWAY 6TH AVE. JACKSON "A" HOTEL II PARK AVE. JACKSON "B" OFFICE BLDG. PLAYHOUSE MALL MAJOR RETAIL THEATRE LIBRARY GOVERNMENTAL Major parking improvements shown by asterisk (*) below.						
ON-STREET PARKING						
Unrestricted	190	155	130	130	130	130
Meter	660	575	480	480	425	420
	850	730	610	610	555	550
OFF-STREET PARKING						
U. R. Temp. Lots	308	348	184	134	120	120
1 S. Park Site	105	120*	120	120	120	120
4/6 6th & Gulch	64	300*	300	300	600*	600
2 S. Jackson	18	18	50*	50	50	50
3 6th & Park	35	0	400*	400	400	400
8 N. Jackson	90	90	0	360*	360	360
7 N. W. Site	0	0	0	0	0	255*
Other Stalls	1,162	1,154	1,146	1,146	1,095	1,065
TOTAL STALLS	2,632	2.760	2,810	3,120	3,300	3,520

[1]City of Helena, Montana Parking Program 1972 - N. G. Jacobson & Associates, Inc.

As indicated by Table V-3, the parking supply projection attempts to distribute needed parking within the downtown core as soon as practical; in keeping with schedules of redevelopment and the availability of funds.

FINANCING

A proposed financing program has been included in the Jacobson study. The proposed financing program combines commitments by (1) the city, (2) downtown property owners, and (3) downtown merchants. The city participates through urban renewal properties, on-street meter revenues and continuing program administration. Downtown property owners participate through Special Improvement District (S.I.D.) assessments and the benefited merchants and businesses participate through a coin validation program and a proposed operations and maintenance subsidy.

Development costs are shown in Table V-3. The proposed funding for the initial phase 1972 through 1974, amounting to 3.3 million dollars, has been proposed as a property assessment of 1.1 million dollars and a revenue bond issue of 2.2 million dollars. A possible financing schedule is shown in Table V-4.

Table V-4

FINANCING SCHEDULE

Year	Gross Revenue	Debt[1] Service	Surplus	O & M[2] Expenses	Net Revenue	Estimated O & M[2] Subsidy
1972	46,000	-	46,000	15,000	31,000	-
1973	105,000	-	105,500	38,000	67,000	-
1974	124,200	121,000	3,200	56,000	-	52,800
1975	142,600	121,000	21,600	84,000	-	62,400
1976	146,900	143,000	3,900	88,000	-	84,300
1977	151,300	143,000	8,300	92,600	-	84,300
1978	155,800	143,000	12,800	97,200	-	84,400
1979	160,500	143,000	17,500	102,100	-	84,600
1980	165,300	143,000	22,300	107,200	-	84,900
1981	170,300	143,000	27,300	112,600	-	85,300
1982-2011	"	143,000/Yr.	"	"		90,000/Yr.

[1]Assume 2 Yrs. Interest Payments Only
35 Yrs. Principal & 5-1/2% Interest
$2,200,000 Issue.

[2]Operations and Maintenance

Source: City of Helena, Montana Parking Program 1972 - N. G. Jacobson & Associates, Inc.

Such a municipal bond sale, as proposed for the 2.2 million dollars must be approved by the voters in the city of Helena.

The 1.1 million for a one-third share of capital improvements and the operation and maintenance subsidy are proposed as a Special Improvement District. Property would be assessed at a uniform rate estimated at $1.38 per square foot.

PARKING SUMMARY

Due to urban renewal processes in the CBD, the status of parking is presently in a state of flux. As urban renewal plans develop, it is apparent that the city is prepared with a program that will provide adequately for the needs of the downtown area.

OTHER TERMINAL FACILITIES

Airport

The Helena City Airport is well located in respect to the city and its existing and future transportation system. It is only about ten minutes driving time from the CBD and the Capitol area, yet the airport is far enough from Helena that the city's expansion will not be limited by the airport location. Ample area exists for present operations and future expansion if necessary. Availability of parking space has not been a problem in the past, however, the increase in commercial and business establishments opposite the terminal building could create a parking problem in the near future.

Bus Terminal

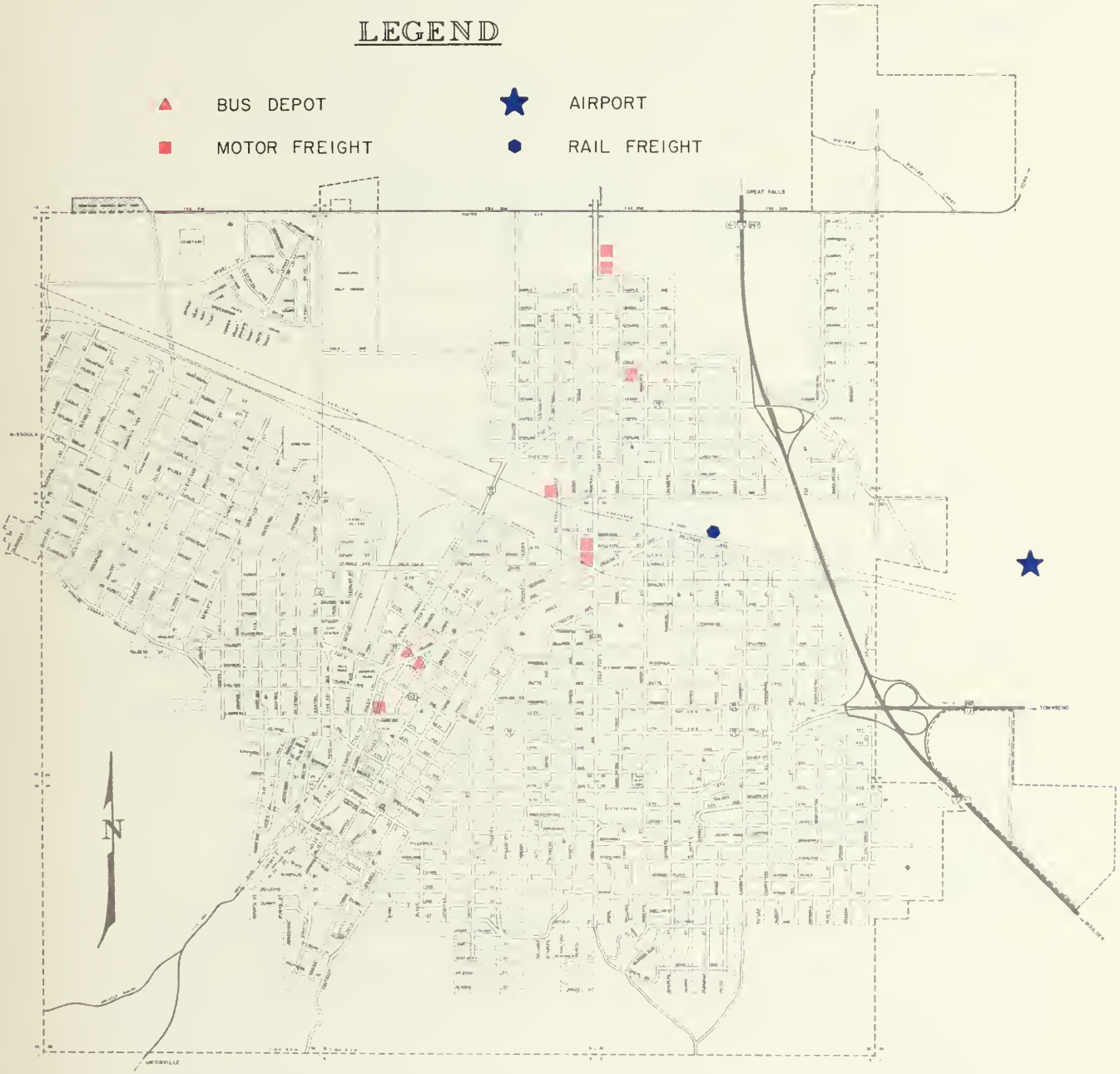
Helena is served by one major interstate bus company, Intermountain Lines, and two intrastate carriers, Rimrock Stages and the Clark Valley Express. The terminal area is located near the intersection of Helena Avenue and Jackson Street, parking is limited in the area and some congestion occurs during peak hours. It appears the facilities are adequate for the present time, but expansion possibilities appear limited.

There are 21 scheduled arrivals and departures each day and services are provided for both passengers and freight. Mail is also handled by all lines.

The terminal area is well located with respect to the CBD and major population centers of the city. If business continues its anticipated upward trend, the facilities may have to be relocated due to the limited parking facilities.

1970 HELENA URBAN TRANSPORATION STUDY

LEGEND



TERMINAL & TRANSFER FACILITIES

Fig. V-4

Motor Freight

Seven motor freight companies have terminal facilities located in Helena. They are as follows:

1. Lincoln Transportation Company, 401 North Main
2. United Buckingham Freight Lines, 1414 North Montana
3. Capital Transfer and Storage, 1700 National
4. Garrett Freight Lines, 2330 Cooke
5. Lloyds Moving and Storage, 2905 North Montana
6. North American Van Lines, 2901 North Montana
7. REA Express, 1410 North Montana

Local and intrastate service is offered by all lines and three are interstate carriers. Most of the terminals are well located with respect to the existing street system. However, ingress and egress to adjacent busy streets is less than desirable in some cases. This is particularly true of the locations in the vicinity of Montana Avenue and its intersection with Helena Avenue. The majority of the carriers have adequate space for present and future operations, most having relocated in recent years with new terminal facilities.

Railroads

Helena is served by Burlington Northern Railroad. Only freight service is provided directly, however, the railroad provides bus service to Amtrack's scheduled passenger service operating through southern Montana.

The railroad has ample space for present operations and possibilities exist for reducing some of the trackage in the area.

Locations of the various terminal and transfer facilities mentioned in this portion of the chapter are shown in Figure V-4.

CHAPTER VI

TRAVEL PATTERNS

Chapter VI

T R A V E L P A T T E R N S

Travel patterns are a basic factor to be considered in the development of a future transportation system which will furnish an acceptable level of service throughout the ensuing 20 year period. These patterns are established from factual information concerning the daily travel of motor vehicles into, within and through the study area. It is also necessary to determine the relationship between these vehicle movements and certain factors explaining why those movements occur, such as the distribution of population and the location of employment and shopping centers. Based on these several elements an estimate of 1990 travel patterns has been developed for the Helena Study Area. This estimate is the end product of a number of inter-related steps in the study procedure as documented in other more detailed reports.

Current travel information was supplied for this study by an Origin and Destination (O&D) Survey conducted in 1969. This survey furnished facts concerning the number of vehicle trips in and through the study area, the purpose and times of these trips, vehicle occupancy and household characteristics related to travel. The procedures and findings of the 1969 Origin-Destination survey are presented as a separate volume, Part I.

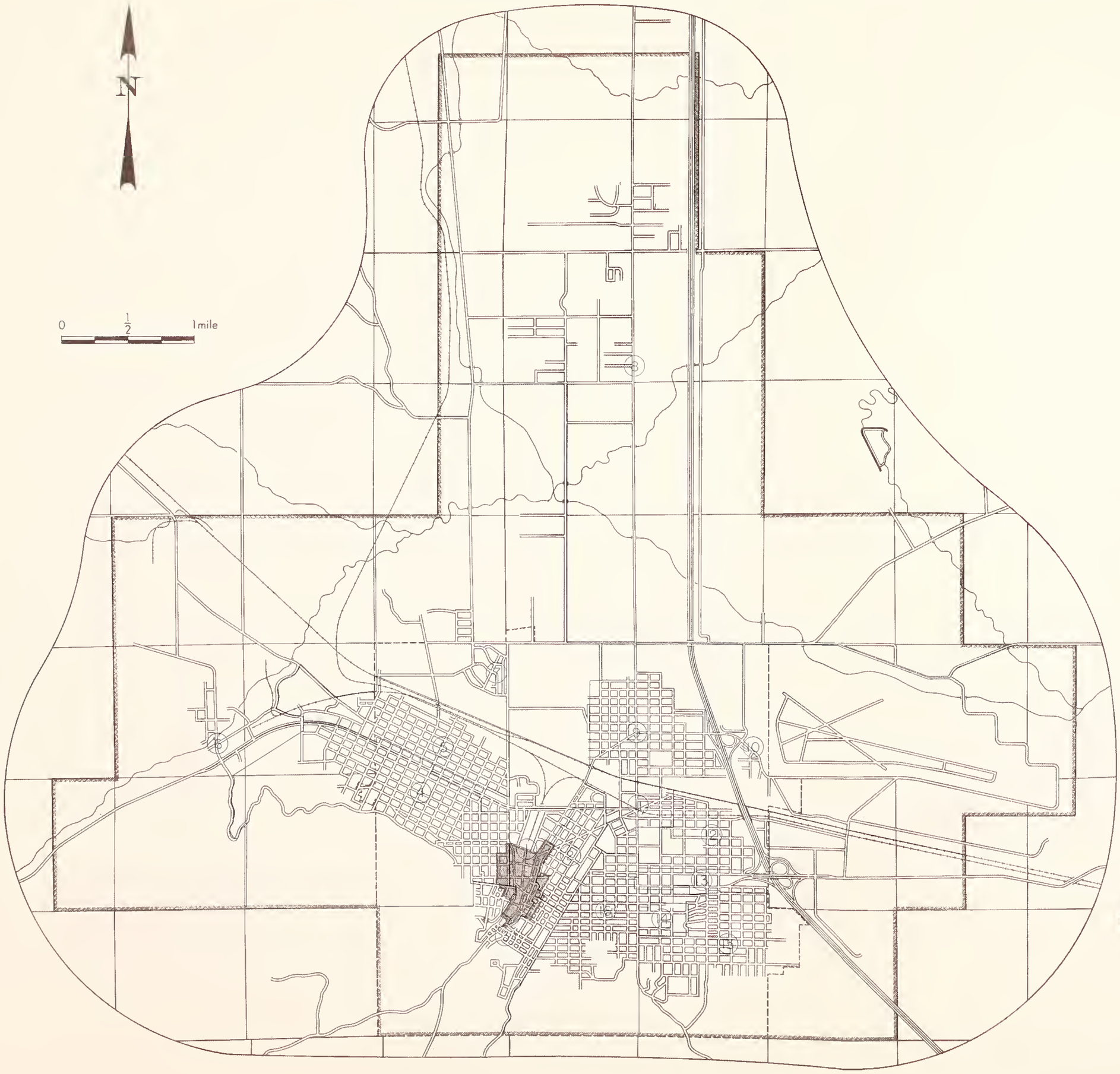
The results of the survey established desire lines of travel between centers of survey districts as shown in Figure VI-1. A "desire line" is an imaginary line drawn between the district where a trip

ended - the destination, as recorded in the O&D Survey. This desire line is drawn without reference to existing streets or actual routes of travel and simply traverses the most direct line between the two district centers. The illustration, therefore, reflects the accumulated desires of individual trip makers, irrespective of the street and highway system. Relative volumes of travel are indicated by scaled bands of varying widths representing average weekday movements. Figure VI-2 shows the existing 1970 desire lines of travel throughout the area as compared to the forecasted desires for 1990.

The greatest concentration of travel desires at the present time generally fall along an east-west axis within the Helena city limits. This is due to the concentration of residential and commercial land use development along this same axis. As substantial residential develop- is expected to occur in the Helena Valley Area during the next 20 years, this gives rise to heavy increases in future travel desires along the Montana Avenue corridor, which is a primary north-south connection. Of the major highway routes leading out of the study area, future traffic increases at the external cordon stations are expected to be heaviest on U.S. 12 to East Helena and south on Interstate 15 into Jefferson County.

Trip data established by the O&D Survey were used as a basis in forecasting the future trips. These forecasts were based on anticipated changes in population and land use in each of 119 survey zones delineated for this particular study. Areawide mathematical equations were used to comput these future trips on a zone by zone basis for five major trip purpose categories: "Home to Work", "Home to Other", "Non-Home Based", "External" and "Trucks". In these equations, trip ends by zone were literally related to other known data by zone, including

1970 HELENA URBAN TRANSPORTATION STUDY



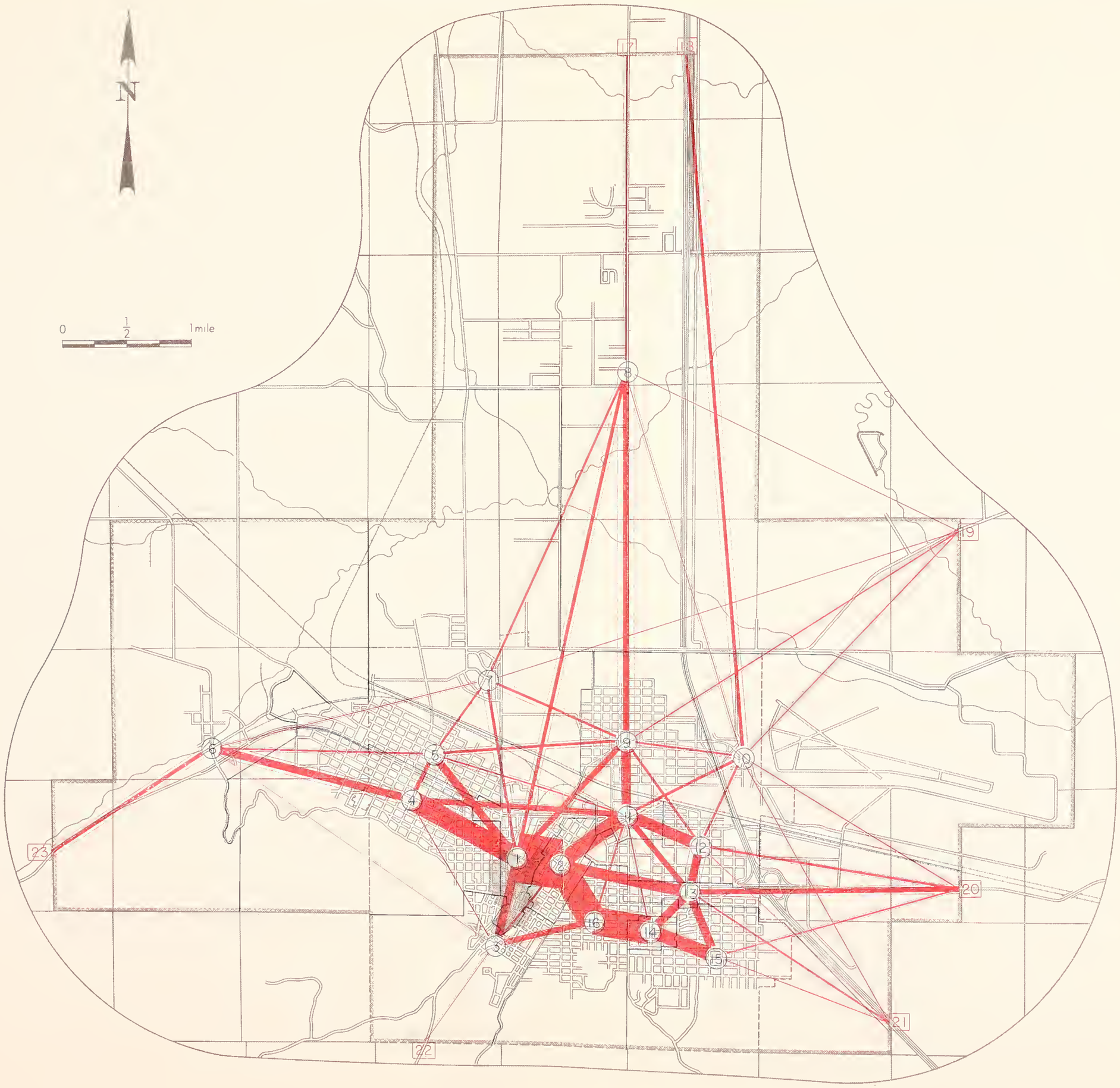
LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- (1) DISTRICT NUMBER
- DISTRICT BOUNDARY

DISTRICT ZONES

Fig. VI-1

1970 HELENA URBAN TRANSPORTATION STUDY



LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- (1) DISTRICT NUMBER
- DISTRICT BOUNDARY
- 1970 [ ] 1990 DESIRE LINES

1,000
5,000
10,000
20,000

1970-1990 DESIRE LINES OF TRAVEL

Fig. VI-2

complete agreement as to their reasonableness.

The future trip end totals by zone were then distributed by electronic computer to all other zones in the study area by a complex mathematical formula known as the "Gravity Model". The output of the Gravity Model is a "square trip table" which indicates the number of trips, if any, between every zone of origin and every zone of destination in the study area. This future triptable was then "assigned" by computer to several versions of the major street network system, including the "Existing Network", "Existing Plus Committed Network" and several "Future Networks". By an intense study of the future traffic on these various networks, a "Recommended future Network" eventually evolves which will give an adequate level of service to all portions of the study area through 1990 and at the same time minimize total transportation costs to the taxpaying public.

CHAPTER VII

RECOMMENDED TRANSPORTATION PLAN

Chapter VII

R E C O M M E N D E D

T R A N S P O R T A T I O N P L A N

INTRODUCTION

The main purpose of this Helena Urban Transportation Study has been to develop a plan for a transportation system which will adequately and effectively provide for the transportation needs of this area through the forecast year of 1990. In the preceding sections of this study, the basic elements pertinent to the development of a long range transportation plan have been evaluated. Past and present conditions of these various elements were reviewed and analyzed and anticipated future conditions forecasted. Based on these studies, the recommended transportation plan presented in this chapter has been formulated.

This transportation plan, while primarily concerned with the movement of people and goods, also takes into consideration the total aspect of the future urban community. How the planned system will affect, and be affected by, the future development of the Helena urban area has been prime consideration in the development of this plan. Although the recommended system for the target year of 1990 does not deviate to any great extent from the existing system it appeared desirable to look beyond the forecast year for future expansion possibilities. A satisfactory plan must be capable of providing for practical means of expansion to care for the demands anticipated even past the forecast year.

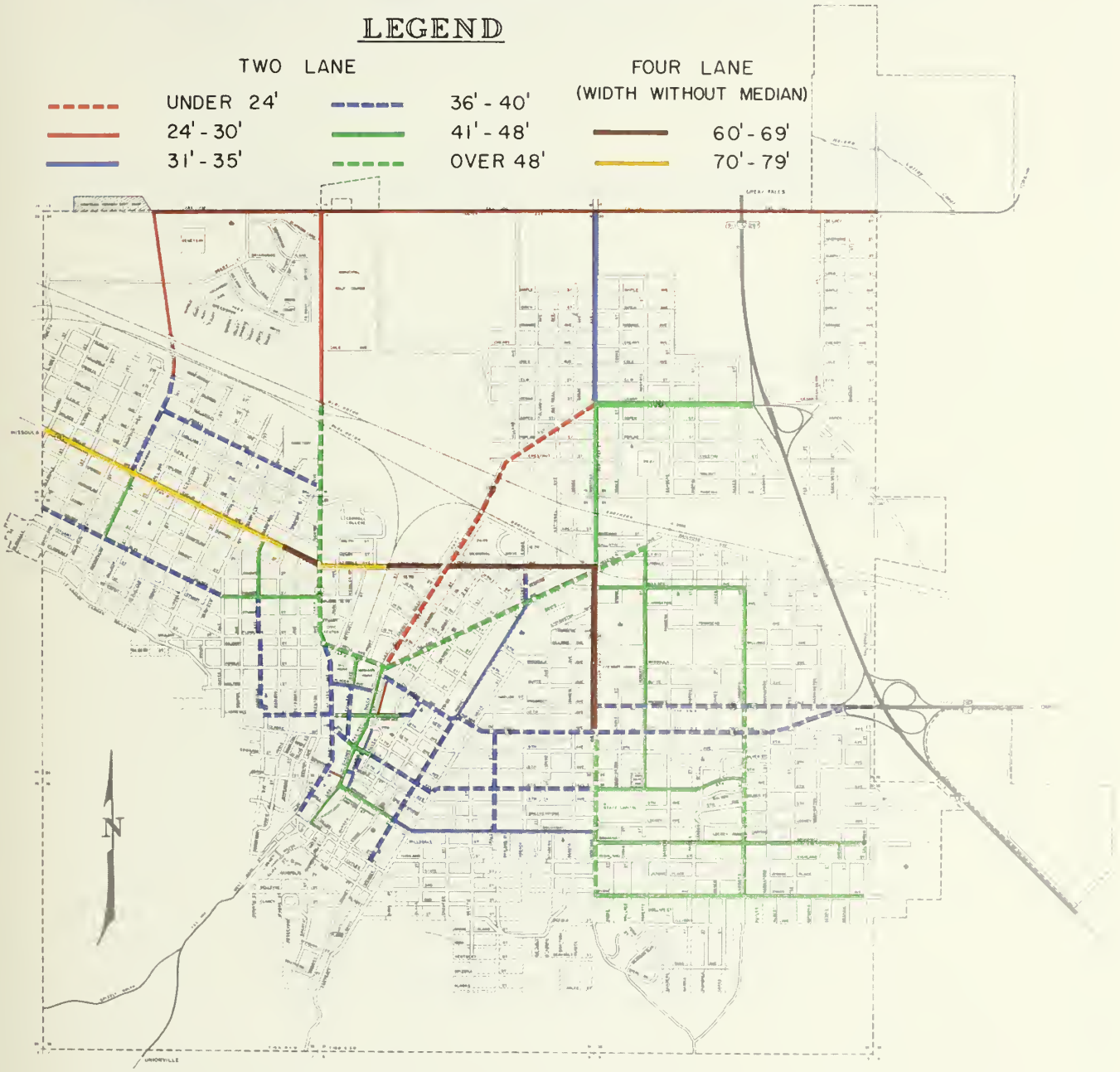
Consideration of this requirement has been incorporated into the Helena Urban Transportation Plan.

All relevant modes of transportation were taken into consideration. As is common to most small urban areas the motor vehicle was determined to be by far the most significant mode of transportation in the Helena urban area and this will continue to be the case throughout the forecast period. The proposed transportation plan is therefore motor vehicle oriented and consists of a system of streets and highways designed to provide for the needs and desires of the motor vehicle user.

This street and highway system which makes up the recommended transportation plan is composed of those facilities which are on the present Federal Aid System and classified as arterials, plus the principal street network. It is forecasted that these facilities will carry approximately 92 percent of the daily vehicle miles of travel in 1990. The network of minor streets has not been included in this plan as these streets generally provide for relatively low volumes of traffic and short trip lengths.

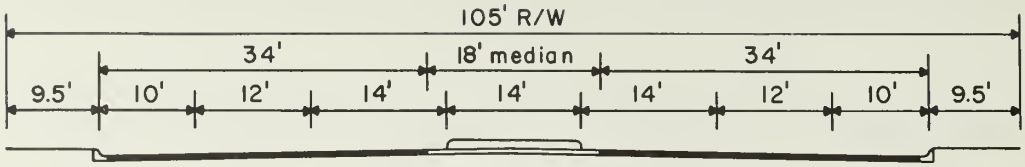
It should be reiterated that the designated locations of the proposed new facilities which are incorporated into this recommended plan are not necessarily final. These designated routes indicate the general location of those facilities ascertained to be required in providing the necessary future transportation system. Before new segments are actually incorporated into the system, or before existing facilities are upgraded to recommended standards, much additional detailed study will be required to determine the final location and design of each facility. Such investigations, when performed near the actual time of construction, will also provide more accurate estimation of roadway and right of way requirements and the associated costs than those presented

1970 HELENA URBAN TRANSPORATION STUDY

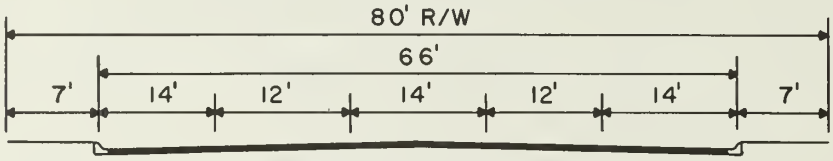


1970 EXISTING STREET WIDTHS

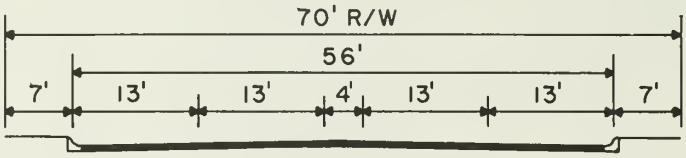
Fig. VII-1



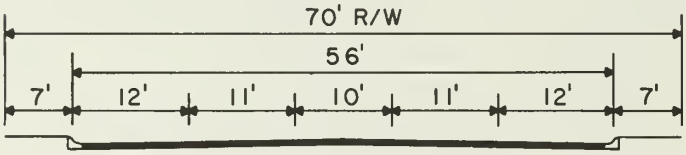
TYPICAL SECTION NO. 1
4-lane with parking-curbed median



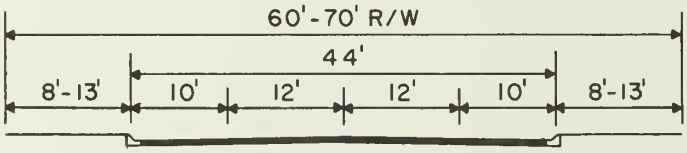
TYPICAL SECTION NO. 2
4-lane no parking with left turn lanes



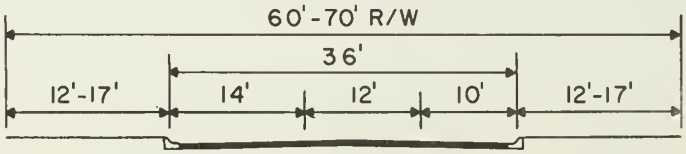
TYPICAL SECTION NO. 3
4-lane no parking with 4' flush median



TYPICAL SECTION NO. 3A
showing provision for left turn lane
at intersections



TYPICAL SECTION NO. 4
2-lane with parking

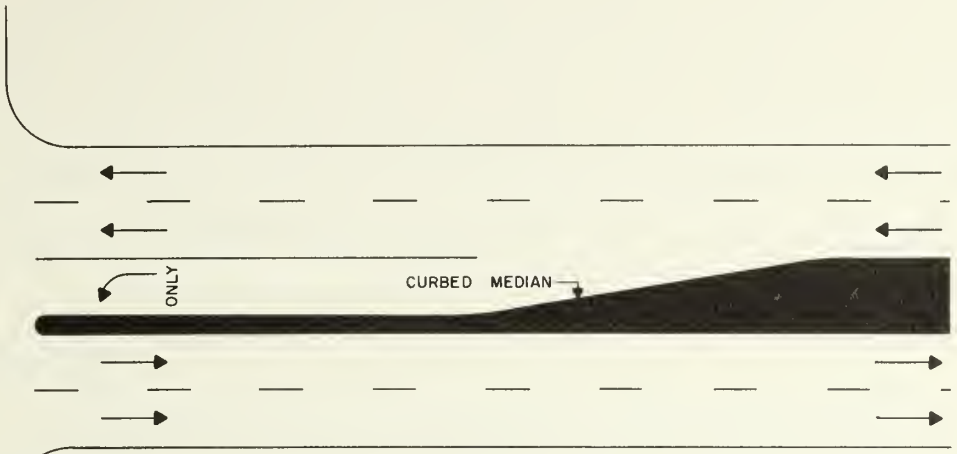


TYPICAL SECTION NO. 5

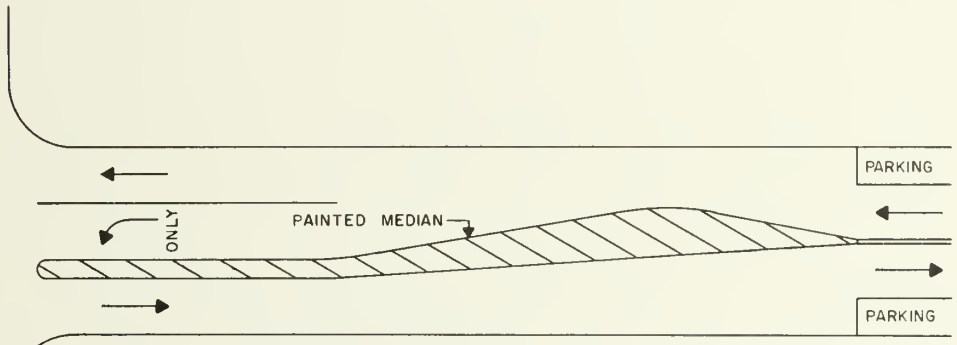
2-lane, one way-parking one side

RECOMMENDED TYPICALS

Fig. VII-2



TYPICAL MULTI-LANE WITH MEDIAN
AND LEFT TURN LANES



TYPICAL WIDENING FOR LEFT TURN
AT INTERSECTION

RECOMMENDED DESIGNS

Fig. VII-3

in this report.

Typical sections and other roadway details illustrated by Figures VII-2 and VII-3 are not to be considered final designs, but are intended only to show recommended designs. When used, these recommended standards will be subject to adjustment by the designer in order to comply with design procedure applicable at the time of design.

PROCEDURE

A determination of the 1990 traffic requirements which must be satisfied by the recommended transportation plan was the initial step in the process of developing the plan. Future traffic forecasts were made by the procedures described in Chapter VI, "Travel Patterns." This future traffic was then assigned by computer, using the "minimum time path" assignment procedure, to the various parts of the street system which included the existing major streets plus those for which construction had been definitely committed. The resultant basic street system with the predicted 1990 traffic volumes on each segment provided the needed delineation of the 1990 traffic requirements.

With the 1990 traffic requirements projected, it was possible to analyze the basic system and determine the existing and future areas of deficiency. Figure VII-4 illustrates 1990 traffic volumes assigned to the existing plus committed network.

Methods of correcting these deficiencies by improving existing facilities or providing new ones, were studied. This was accomplished by incorporating the proposed alternate solution into additional computer assignments. Through a step-by-step process of evaluating the various assignments, the recommended plan evolved.

The total system studied incorporated a wide variety of solutions to the problem areas delineated by the 1990 traffic assignment. A brief description of those portions of the total network that were studied but discarded from the final recommended plan are discussed in the following paragraphs. Figure VII-5 indicates those routes that were considered.

STUDY ALTERNATES

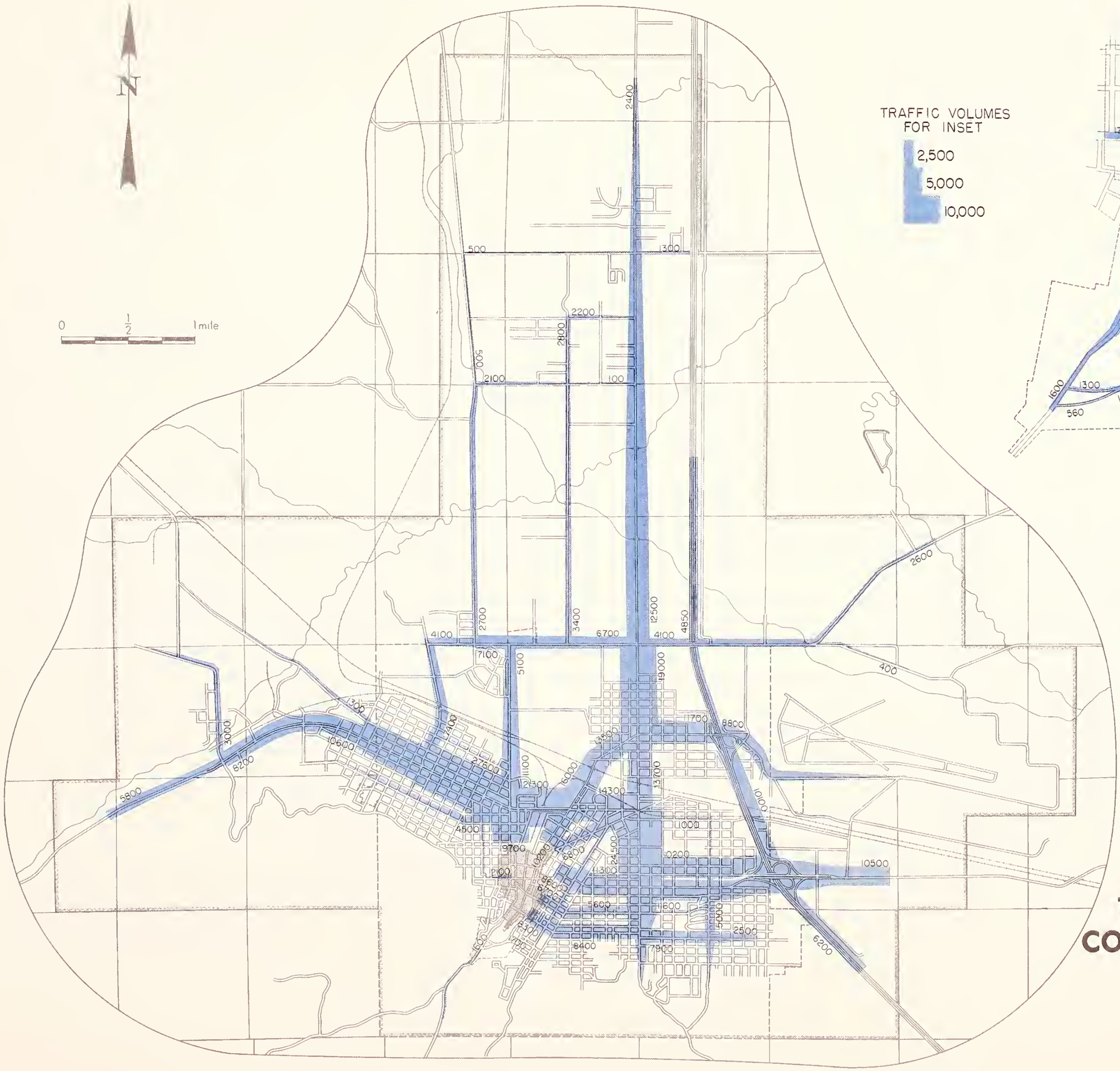
1. North Benton Avenue Connection - to the Old Silver Road. (0.5 mile cutoff at an estimated cost of $735,000.)

Although this link appeared to have good possibilities for attracting traffic it did not load enough traffic to justify its construction. Volumes on the Old Silver Road remained low despite attempts to upgrade its service to traffic from the west valley area to the CBD via Benton Avenue. Should future land use increase the density of development in the vicinity of the Old Silver Road producing trips to the center of the city, this minor road development should be easily justified.

2. North Bypass - beginning at Cedar Street and extending westerly, north of the railroad tracks, to an intersection with US 12 near Kessler School. (approximately 2.7 miles at an estimated cost of $4,545,000.)

This facility loaded between 7,700 vehicles to 3,500 vehicles on an average daily basis. All of the traffic was attracted from Euclid Avenue, lowering the volumes on this facility by a like amount. The estimated cost of close to five million dollars for this facility indicated that the benefits would be questionable within the twenty year projection. This was especially true in view of the fact that the Euclid-Lyndale cross town facility would handle the projected traffic.

1970 HELENA URBAN TRANSPORTATION STUDY



LEGEND

STUDY AREA

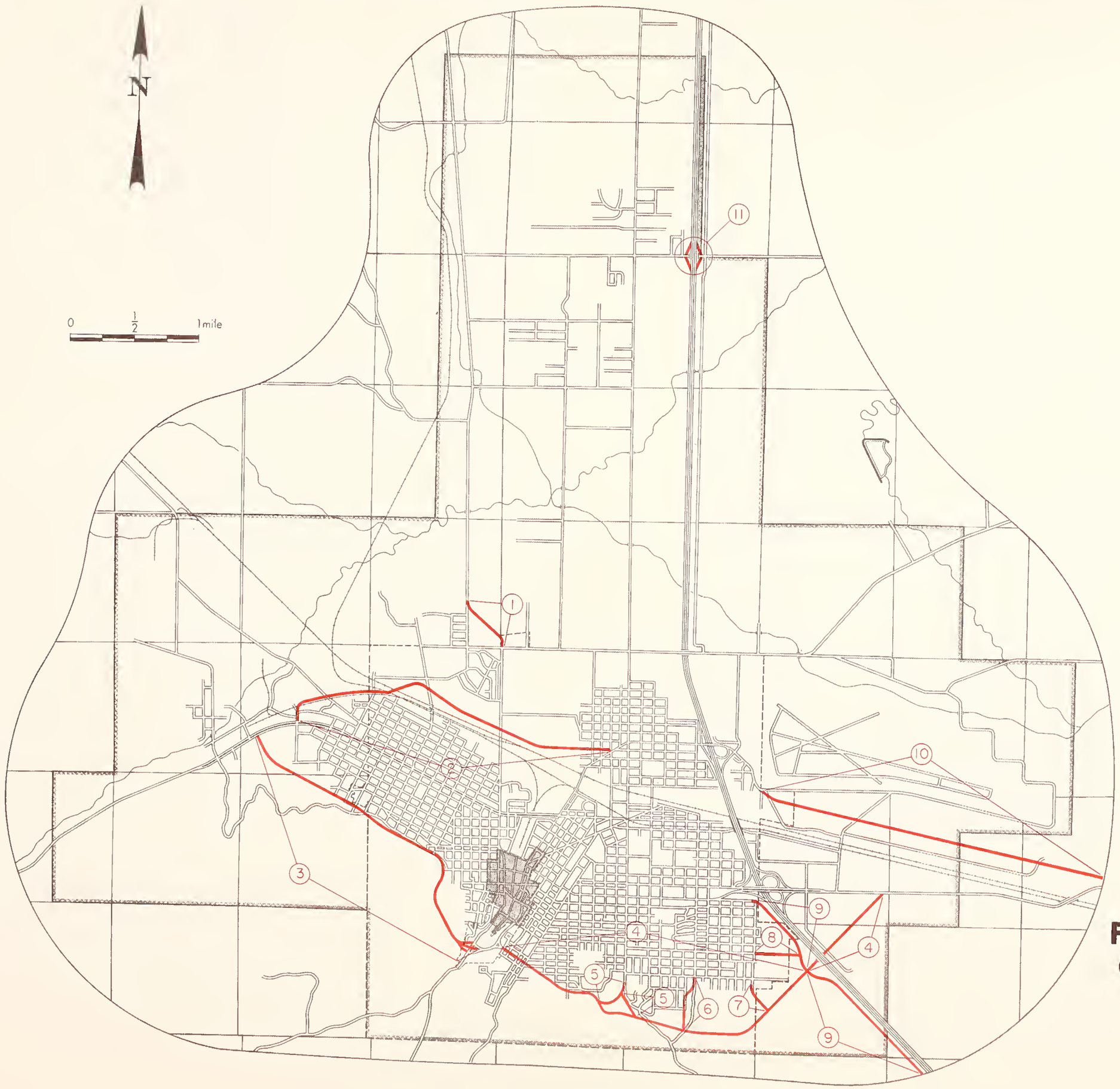
CENTRAL BUSINESS DISTRICT

5,000
10,000
20,000
TRAFFIC VOLUMES

1990 TRAFFIC VOLUMES COMMITTED NETWORK

Fig. VII-4

1970 HELENA URBAN TRANSPORTATION STUDY



LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- ALTERNATE ROUTE
- (0) ALTERNATE NUMBER

FUTURE NETWORK CONSIDERATIONS

Fig. VII-5

3. LeGrande-Cannon Boulevard - beginning at a junction with US 12 in the Broadwater area and extending easterly along the slopes of Mount Helena to the south end of the CBD area. (2.5 miles at an estimated cost of $4,539,000.)

Traffic volumes loaded on this proposed facility varied from 2,600 to 7,700 vehicles on an average daily basis. The high initial cost of this facility, the possible high cost of maintenance, and the fact that the attracted traffic volumes were comparatively low indicated that this proposed facility also had questionable benefits within the study period.

4. South Bypass - beginning at Jackson Street and extending easterly along the south edge of the city, crossing I-15 with a grade separation approximately 0.5 mile south of the Capitol Interchange, and intersecting with US 12 in the vicinity of the tank farm. (approximately 3.6 miles at an estimated cost of $6,350,000.)

This facility will depend on connections to some of the major north-south arterials such as Montana Avenue and Lamborn Street that are discussed later in this section. Traffic volumes varied from 8,000 ADT near the CBD to a low of 2,400 ADT just east of the Montana Avenue connection with the majority of the route loading less than 3,500 vehicles per day. The high cost of this route and its low traffic volumes east of Montana Avenue indicated that a higher land use density would be necessary to justify its construction than what had been projected during the study period. The possibility that stage construction would be desirable is evident from the projected volumes between Last Chance Gulch and Montana Avenue. This section appears to serve traffic from the east residential areas near Montana Avenue destined for the CBD. The total route, however, does not appear to be justified during the

time frame of this study.

5. Montana Street Extension - to the South Bypass route (0.5 mile at an estimated cost of $786,000.)

This project is dependent on the existence of the south bypass route and could not be justified otherwise.

6. Lamborn Street Extension - to the South Bypass route (0.4 mile at an estimated cost of $685,000.)

This project is dependent on the existence of the south bypass route and could not be justified otherwise.

7. California Street Extension - to the South Bypass route (.2 mile at an estimated cost of $393,000.)

This project is dependent on the existence of the south bypass route and could not be justified otherwise.

8. Broadway Avenue Extension - to the west frontage road along I 15 (0.3 mile at an estimated cost of $530,000.)

This extension would be feasible with the existence of a frontage road flanking the interstate. Higher land use density could make it desirable otherwise it is not justified under the projected land use plan.

9. West Frontage Road - I 15 - (1.5 miles within study area at an estimated cost of $2,495,000.)

The high cost of this section, attracting less than 2,000 vehicles on a daily basis, would eliminate warrants for its construction during the study period. Rapid development in this area could justify its construction before 1990; however, the continued surveillance of land use, population and employment would indicate the timely construction of the facility.

10. Airport Bypass - an extension of the present airport access to the east, terminating at an intersection with US 12 outside of the study

area boundry. (1.6 miles within the study area at an estimated cost of $2,683,000.)

Although good access to the airport terminal facilities was given prime consideration, it was determined that the access requirements could be satisfied without this costly facility.

11. Sierra Drive Interchange - (addition of ramps to the existing overcrossing at an estimated cost of $700,000.)

The addition of this access to I 15 did not appear to attract a large enough volume of traffic to justify its construction during the time frame of this study. An assignment of 1990 volumes diverted approximately 2,500 vehicles from North Montana Avenue through the interchange. Volumes on Montana Avenue remained high enough to warrant a four-lane facility. Future land use development east of the Interstate will probably create the greatest need for the development of this particular facility.

The 11 locations discussed above, totaling an estimated $24,400,000, all have considerable merit and perhaps most of them will ultimately be incorporated into the transportation system, they did not, however, appear to be warranted during the study period. Constant surveillance of the major elements of community development should indicate, in the different geographic locations, the need for reevaluation of any one of the locations.

RECOMMENDED PLAN

The recommended transportation plan for the Helena Urban Area is shown in Figure VII-6. This map delineates the proposed major street and highway sytem, which is composed of arterials and a limited number

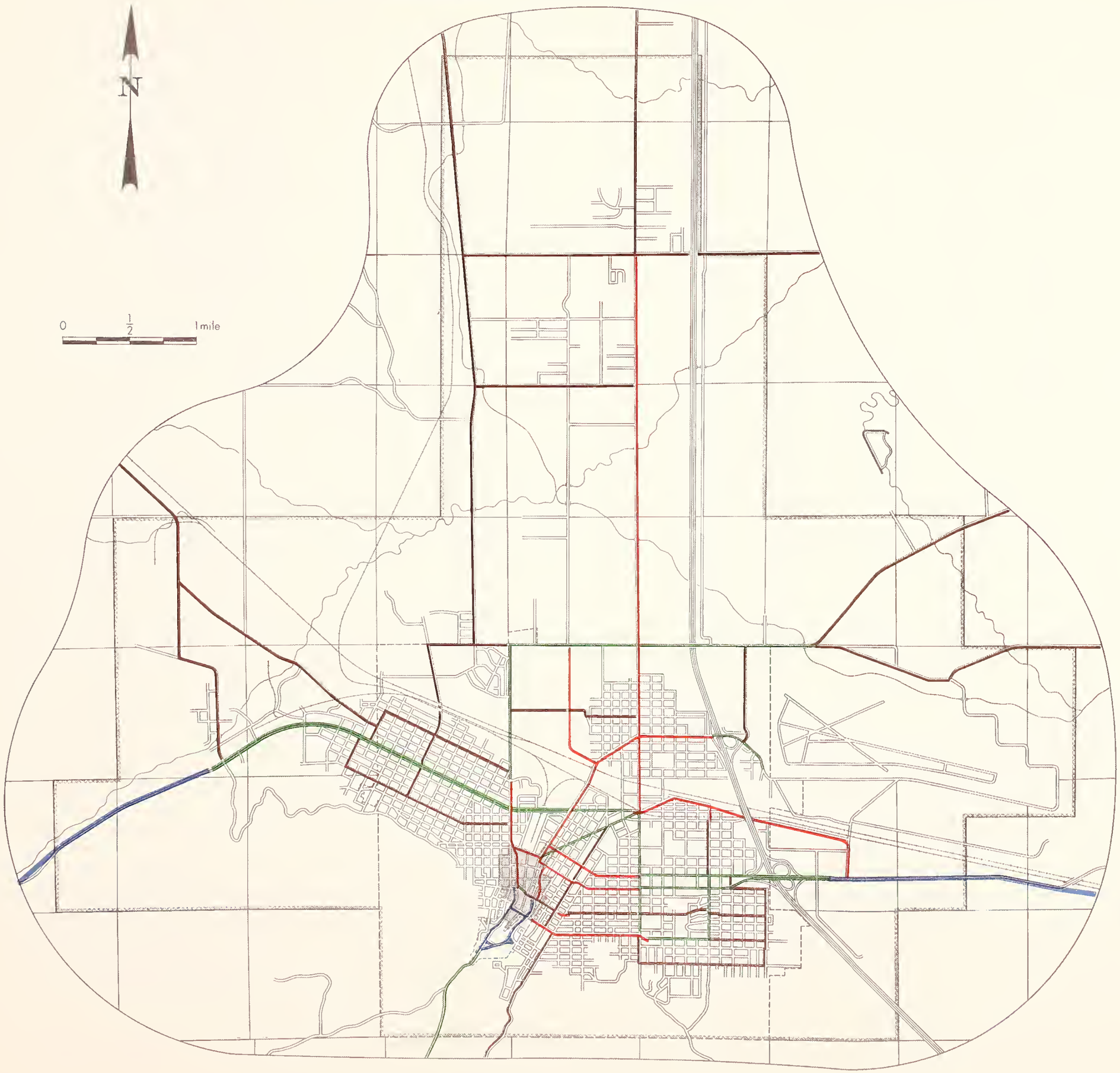
of collector streets.

Arterials

The arterial portion of the recommended system is made up of those streets proposed to have the classification of an arterial by 1990, including all existing state and Federal numbered routes. This system continues the basic grid pattern wherever possible although in some of the older areas of town no symetrical grid system exists.

Two arterial projects are presently under construction, both in the urban renewal area. These projects and those which are programmed for construction are listed in Table VII-1. These arterials, in combination with the ones on which no construction is proposed, are shown in Figure VII-8 and make up the arterial system for the recommended plan. It should be noted here that most of the streets and highways in this category appear to be adequate for the estimated 1990 traffic without requiring additional construction.

1970 HELENA URBAN TRANSPORTATION STUDY



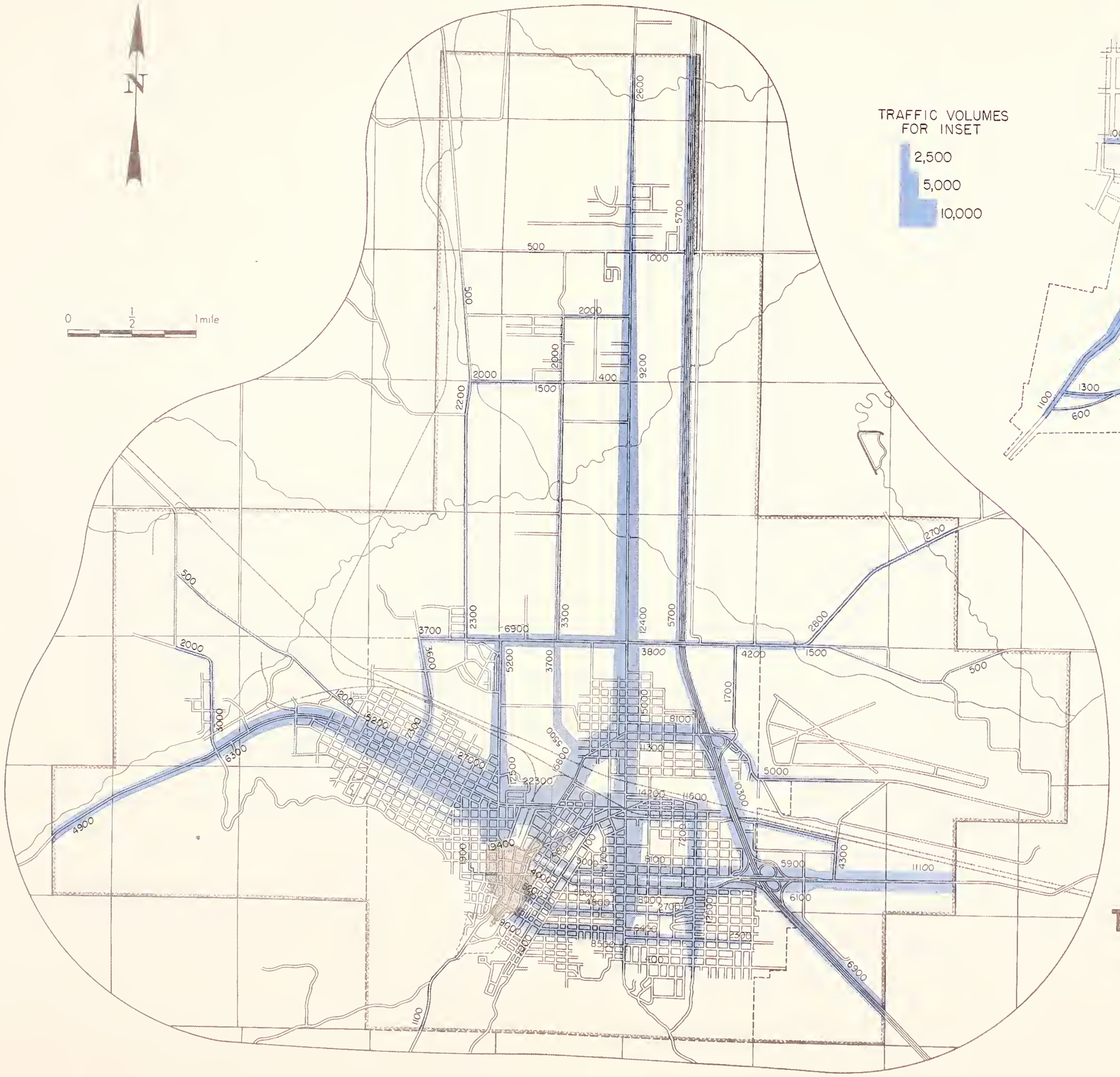
LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- COMMITTED IMPROVEMENT
- PROPOSED IMPROVEMENT
- OTHER ARTERIALS
- COLLECTOR STREET

RECOMMENDED SYSTEM

Fig. VII-6

1970 HELENA URBAN TRANSPORTATION STUDY



1990 TRAFFIC VOLUMES RECOMMENDED NETWORK

Fig. VII-7

Table VII-1

PROJECTS PROGRAMMED OR UNDER CONSTRUCTION

Highway	Project Number	Project Limits	Length (Miles)	Typical Section	Status	Estimated Cost
U.S. 12 (East)	F-77(17)	From end four-lane to study area limit	*1.71	Four-lane with curbed median	Programmed	4,600,000
U.S. 12 (West)	F-249(18)	From near Jct. F.A.S. 356 to Study area limit	*2.17	Four-lane	Programmed	3.340,000
Park Avenue F.A.S. 454 (South)	UR73-4	From near Cutler to Broadway	0.19	Four-lane	Complete	225,000
Park Avenue F.A.S. 454 (North)	UR74-7	From Broadway to 6th & 6th from Park to Fuller	0.24	Four-lane	Under Const.	226,000
New Jackson St. local(A)	UR71-05A	From F.A.S 454 to Broadway	0.40	Four-lane	Complete	440,000
New Jackson St. local(B)	UR74-10	From Broadway to 6th Avenue	0.16	Four-lane	Complete	180,000
Broadway Local	UR71-31A	From Warren St. to Park Ave.	0.16	Two-lane, No Parking	Complete	92,000
City Streets	F999?(7)	Last Chance, Helena Neill, Warren St., & 11th Ave. Custer & Montana Avenues	-----	Signing, Signals	Under Const.	69,000
Montana Ave.	FF401( )	Mont. Ave., Helena and Boulder St.	-----	Signals	Programmed	46,000
Mont. Ave. 11th & Prospect	FF401( )	Mont. Ave. & 11th & Prospect	-----	Signals, Signing	Programmed	42,000
Euclid Ave.	F 249( )	Storm Drain	-----	Four-lane	Programmed	410,000
11th & Prospect Avenues	FF214( )	Signals	-----	New Signals	Programmed	120,000
TOTALS						9,790,000

* Length of project within the study area limits only.
Revised January 15, 1975

RECOMMENDED PROJECTS

Table VII-2 lists the length, recommended typical section, estimated costs and the possible split in local, State and Federal obligation for the recommended projects. Ten of the projects have been given an immediate priority ranking. Although the projects are listed in a specific order, priorities will have to be adjusted to meet available financing and current needs. A brief discussion of each project follows including an approximate volume/capacity ratio for present and future average daily traffic volumes using the existing facility. Peak hour volumes would indicate a higher volume/capacity ratio in most cases.

PROJECT A - NORTH MONTANA AVENUE

From Cedar Street to Ehlers Corner, FAU 5809, 3.7 miles.

Present Conditions

A two-lane highway with mostly rural and suburban characteristics. Built in 1934 with a roadway of approximately thirty feet with a twenty-two foot paved surface. Present right-of-way varies from between seventy to one-hundred feet, traffic volumes vary from 9,000 ADT between Cedar Street and Custer Avenue to a low of 2,750 ADT near Ehlers Corner. Majority of the section is over 5,000 ADT. Capacity of the section, based on a forty mph operating speed is approximately 750 vph or 7,500 ADT. The 1970 volume/capacity ratios varied from 1.2 to 0.4.

Future Conditions

Traffic along the entire section is expected to have an average increase of approximately 230 percent by 1990. This would indicate volume/capacity ratios of 3.3 to 0.9 along this section length using the existing two-lane facility.

Table VII-2

RECOMMENDED ARTERIAL STREET PROJECTS

PRIORITY	PROJECT	DESCRIPTION	LENGTH	TYPICAL SECTION	ESTIMATED COST	ESTIMATED PARTICIPATION (Thousands) LOCAL	FEDERAL	STATE
NR	A_1	NORTH MONTANA AVE.-Cedar St. to Custer Ave. 4-Lane Divided Hwy (FAU 5809)	0.68	1	C= 510.0 R/W= 161.6 671.6	4.0	497.0	170.6
NR	A_2	NORTH MONTANA AVE.-Custer to Ehlers Corner 4-Lane Divided Hwy (FAU 5809)	3.00	1	C= 2,250.0 R/W= 712.8 2,962.8	0	2,192.5	770.3
NR	B	NORTH MONTANA AVENUE-Lyndale to Cedar St. R.R. O.P. over B.N. w/4-Lane Undivided Facility (FAU 5809)	0.58	3	C= 1,190.0 R/W= 0.0 1,190.0	3.4	880.6	306.0
NR	C	CEDAR ST.-Montana Ave. to Cedar St. Interchange (I-15) Full 4-Lane Divided Hwy (FAU 5807)	0.57	1	C= 427.5 R/W= 90.3 517.8	3.3	383.2	131.3
NR	D	NORTH LAST CHANCE GULCH-Lyndale Avenue to Montana Avenue-Full 4-Lane Divided Hwy (FAU 5807)	0.83	1	C= 872.5 R/W= 131.5 1,004.0	4.8	743.0	256.2
3	E	NORTH LAST CHANCE GULCH-Neill Avenue to Lyndale Avenue. 4-Lane Hwy w/left turn bays-No parking (FAU 5807)	0.45	2	C= 270.0 R/W= 213.8 483.8	2.6	358.0	123.2

NR-Not ranked by priority

Table VII-2 Continued

RECOMMENDED ARTERIAL STREET PROJECTS

PRIORITY	PROJECT	DESCRIPTION	LENGTH	TYPICAL SECTION	ESTIMATED COST	ESTIMATED PARTICIPATION (Thousands) LOCAL	FEDERAL	STATE
NR	F_1	11th AVENUE-Last Chance Gulch to Montana Avenue Alt. #1- 4-Lane Hwy - No turn bays (FAU 5812)	0.86	3	C= 430.0 R/W= 120.0 550.0	2.2	407.0	140.8
NR	F_2	Alt.#2 - One way couplet utilizing Prospect Avenue and 13th St. as westbound movement. See Proj. H. (FAU Rts. 5810 & 5812)	*0.82	4	C= 738.0 R/W= 522.0 1,260.0	1.6	932.4	326.0
2	G	PARK ST.-Neill Avenue to 6th Avenue - 4-Lane Hwy w/left turn bays-no parking (FAU 5805)	0.31	2	C= 186.0 R/W= 245.6 431.6	1.8	319.4	110.4
NR	H	*NEILL AVENUE-Park Avenue to Last Chance Gulch (Coincident with F_2. Costs will vary depending on selection of alternate.) (FAU 5812)	*0.25	4	C= 112.5 R/W= 75.0 187.5	2.5	138.8	46.2
NR	I	HELENA-RAILROAD AVES. - Montana Ave. to Jct.w/U.S. 12 4-Lane facility. Costs include reconstruction of intersection of Montana and Lyndale (FAU 5806)	1.97	2	C= 1,182.0 R/W= 468.1 1,650.1	6.0	1,221.1	423.0

NR-Not ranked by priority
* Average of couplet

Table VII-2 Continued

RECOMMENDED ARTERIAL STREET PROJECTS

PRIORITY	PROJECT	DESCRIPTION	LENGTH	TYPICAL SECTION	ESTIMATED COST	ESTIMATED PARTICIPATION (Thousands) LOCAL	FEDERAL	STATE
NR	J	BROADWAY-Warren St. to Montana Avenue- 2-Lane w/parking-does not include TOPICS project at intersection with Montana (FAU 5816)	0.90	4	C= 600.0 R/W= 0.0 600.0	9.5	445.0	145.5
1	K	BENTON AVENUE-Euclid Avenue to Neill Avenue 4-Lane Facility - No Parking - Partial reconstruction (FAU 5805)	0.31	3	C= 46.5 R/W= 0.0 46.5	1.8	34.4	10.3
NR	L	BENTON AVENUE-Hollins Avenue to Euclid Avenue Proposed 4-Lane Facility (Local)	0.23	2	C= 138.0 R/W= 15.2 153.2	1.3	113.4	38.5
NR	M	6th AVENUE-Spot Improvement at Davis Street Intersection - 2-Lane Facility to remove jog (Local costs included in TOPICS, Chapter VIII, Item 16.) (FAU 5814)	0.09	4	C= R/W=	-	-	-
NR	N	LAMBORN STREET- Railroad Avenue to Boulder Avenue 2-Lane Facility (FAU 5813)	0.06	4	C= 36.0 R/W= 0.0 36.0	0.3	26.6	9.1

Table VII-2 Continued

RECOMMENDED ARTERIAL STREET PROJECTS

PRIORITY	PROJECT	DESCRIPTION	LENGTH	TYPICAL SECTION	ESTIMATE COST	ESTIMATED PARTICIPATION (Thousands) LOCAL	FEDERAL	STATE
4	O	CRUSE AVE. - 6th Avenue to 11th Avenue (FAU 5815)	0.29	4	C= 480.0 R/W= 120.0 600.0	3.0	444.0	153.0
NR	P	McHUGH LANE EXTENSION-Custer Avenue to North Last Chance Gulch (Local)	0.97	4	C= 500.0 R/W= 465.0 965.0	965.0	0.0	0.0
		TOTAL COSTS Alternate 1 (11th Avenue)			$12,049.9	1,011.5	8,204.0	2,834.4
		Alternate 2 (11th Avenue)			$12,759.9	1,010.9	8,729.4	3,019.6

1970 HELENA URBAN TRANSPORTATION STUDY

LEGEND

- STUDY AREA
- CENTRAL BUSINESS DISTRICT
- COMMITTED IMPROVEMENT
- PROPOSED IMPROVEMENT

RECOMMENDED IMPROVEMENTS

Fig. VII-8

Recommendations

It is recommended that the section be rebuilt in two units. The first section, Project A_1, from Cedar Street to Custer Avenue is presently operating at a V/C ratio of 1.1, and the increase of new commercial establishments along the roadway will substantially increase traffic volumes in the near future. A four-lane section, Typical Number 1, is recommended since it will provide the necessary capacity and safety features. A traffic signal should be provided for the intersection of Montana and Custer Avenues and a project to do this is presently programmed.

Project A_2 from Custer Avenue to Ehlers Corner experiences a higher operating speed with a loss in capacity as compared to the above section. Present V/C ratios are 0.4 - 0.7 over the three mile length. A considerable amount of roadside friction is created due to the strip development of the area and the need for refuge for turning movements is evident. It may also be advantageous to investigate the possible need of collector-distributor or frontage roads throughout the length of the section. Such a detailed study could be a function of the continuing phase.

PROJECT B - NORTH MONTANA AVENUE

From Lyndale to Cedar Street. FAU 5807, 0.58 miles.

Present Conditions

A two-lane highway running through a commercial-industrial area crossing the main freight tracks of the Burlington Northern Railroad at grade. The section was constructed in 1934 on a twenty-four foot roadway with the full section width paved.

Present R/W varies between ninety and one-hundred feet. The 1970 average daily traffic volume was approximately 7000 throughout the length of the section. A V/C ratio of 0.6 - 0.9 indicates a possible level of service D on this important link.

Future Conditions

Traffic volumes increasing to 14,000 ADT by 1990 could not be handled on the existing facility. A V/C ratio of 1.5 - 1.7 would make the section a serious bottleneck coupled with the hazards of the at-grade railroad crossing.

Recommendations

A minimum four-lane section, Typical Number 3 on Figure VII-2, would provide the required capacity within the existing right-of-way. A railroad grade separation would also be necessary to bring the facility up to a minimum acceptable standard. Consideration would have to be given to the restriction of left turns or the signalization of the high volume intersections due to the absence of left turn refuge on this typical section.

PROJECT C - CEDAR STREET

Montana Avenue to the Cedar Street interchange on I-15, an urban FAU 5807 street, 0.57 miles.

Present Conditions

This street was reconstructed in 1962 as part of the Interstate improvement. It has been placed on the urban system as a principal arterial street. A paved roadway width of forty-eight feet handles the existing traffic with a low V/C ratio of 0.5 - 0.6, providing a high level of service. The street provides one of the two accesses to the interstate and

also is the main access to the airport facilities from the CBD and major residential areas.

Future Conditions

The steady growth of new commercial business along this route indicates the future need of a higher capacity section. The 1990 volume in excess of 13,000 ADT would produce V/C ratios of 1.5 - 1.7.

Recommendations

A full four-lane section is recommended to provide for the turning movements involved in this type of commercial development. Consideration should be given to adding a parallel structure across the interstate to provide for the needs of both interstate access and the future development of the airport terminal and surrounding areas. This cost has not been included in the cost estimated in Table VII-2 since the project limits were terminated at the west ramp intersections with Cedar Street.

No improvements are recommended on the extension of Cedar Street from the interchange to the airport terminal. Volumes did not appear to warrant a higher type facility. There are some indications that the area immediately south of the airport could develop into an extensive commercial-industrial area along with the increased airport terminal activities. For these reasons a close review of the future traffic volumes using the airport access is recommended in the continuing phase.

PROJECT D - NORTH LAST CHANCE GULCH

From Lyndale Avenue to Cedar Street. FAU 5807, 0.83 miles.

Present Conditions

A two-lane concrete section built in 1934 having a twenty foot paved width on a forty foot roadway with an ADT of 7,000 to 9,000.

Present V/C ratios varying from 1.2 to 1.4 throughout its length indicate a present need for reconstruction.

Future Conditions

Volumes will increase to 15,000 - 16,000 ADT by 1990. A V/C ratio of 2.6 would be the result of such an increase on the existing facility.

Recommendations

A full four-lane facility is recommended as indicated by Typical Section Number 1 to replace the inadequate sections that presently exist. The new facility should also provide adequate pedestrian walks due to the proximity of the parks, the YMCA and the need for pedestrian facilities over the Burlington Northern Railroad.

PROJECT E - NORTH LAST CHANCE GULCH

From Neill Avenue to Lyndale Avenue, FAU 5807, 0.45 miles.

Present Conditions

This section of roadway is also old and narrow, a concrete section built in 1934 on a forty foot roadway with twenty feet paved. Patchwork has since extended the width of the paved section, but it appears to need reconstruction. A present ADT of 6,500 indicates a V/C ratio of 1.0, which is at level of service E, or capacity. The area is primarily commercial with the inherent problems of parking maneuvers and heavy turning movements.

Future Conditions

An increase in traffic volumes to over 10,000 ADT will produce a V/C ratio of 1.7 - 1.8, indicating an undesirable situation. Additional activity due to the commercial build up will also add to the problems of traffic circulation.

Recommendations

Due to the high cost of right-of-way through this area, a minimum four-lane section is recommended. The typical section would provide a median left-turn lane in addition to the four thru lanes. No on street parking would be possible.

PROJECT F - 11TH AVENUE

Last Chance Gulch to Montana Avenue, 0.84 miles.

Present Conditions

This street operates as the main arterial connection between the CBD and the eastside commercial developments. It also serves as access to the Interstate via the Capitol interchange and as a crosstown arterial for traffic from the west residential areas bound for the capitol complex. Present volumes range from 7,600 ADT to 9,900 ADT. A level of service E is evident with V/C ratios equalling 1.5. Peak hour volumes operate at a level of service F. Built in 1918 the street has a thirty-six foot paved section.

Future Conditions

Since the facility is presently operating over its capacity, any increase in traffic volumes along these desired lines will be forced to use other routes. Although the 1990 assignment increased volumes on 11th Avenue thirty to forty percent due to the lack of a capacity restraint, this would not be physically possible in actual practice.

Recommendations

Two alternates are possible.

Alternate # 1 (F_1) - a four-lane section, Typical Number 3.

This alternate requires a minimum of 70 foot of right-of-way.

Since 11th Avenue varies between 60 to 70 feet of right-of-way at the present time, this would mean 10 to 15 feet of additional right-of-way would be necessary for construction. It would also be necessary to provide an adequate terminal facility at the west end of the street at the intersection of Last Chance Gulch, Neill Avenue and Helena Avenue.

Alternate #2 (F_2) - a one-way couplet utilizing 11th Avenue for eastbound traffic and Prospect Avenue and 13th Street for westbound traffic. New locations would be required between Hoback and Rodney Streets and between Front and Getshell Streets. This alternate is more expensive than alternate #1; however, it would provide more capacity and result in a more flexible system for the prime east-west movements through the center of the city. The city has indicated a preference for this alternate.

PROJECT G - PARK STREET

Neill Avenue to 6th Avenue, FAU 5805, 0.31 miles.

Present Conditions

The street is presently operating as the northbound leg of a one-way couplet with an ADT over 5,000. Under such conditions capacity is controlled by the signalized intersection at Lawrence Street which indicates a level of service B.

Future Conditions

Urban renewal activity, concentrated south of this particular section, provides a four-lane two-way facility through the area. To provide this continuity on the north end of Park Avenue, it is also planned to revert this section to a four-lane, two-way section.

Recommendations

To best utilize the existing facility, a four-lane section with

provisions for turn refuge is recommended. No on-street parking would be possible.

The continuity provided by this reversion to a two-way facility should feed traffic from Benton and Euclid onto 6th Avenue and Broadway, thereby, alleviating some of the problems on 11th Avenue and Montana.

PROJECT H - NEILL AVENUE

Park Avenue to Last Chance Gulch, FAU 5812. The street was reconstructed in 1959 and still has a reasonably adequate riding surface. The street operates as a three-lane facility, two-lanes eastbound, one-lane westbound with parking on both sides. Volumes are presently in the range of 10,000 - 14,000.

Future Conditions

No great increase in traffic volumes are indicated by the 1990 assignment. Other improvements and changes in the system would alleviate this particular segment.

Recommendations

In leiu of a one-way couplet extension to 11th and 13th Avenues, it is recommended that this section become a four-lane facility. This can be easily accomplished with no major reconstruction by the removal of parking on at least one side.

PROJECT I - HELENA AND RAILROAD AVENUES, FAU 5806

Montana Avenue east to a junction with U.S. 12, FAU 5806, 1.85 miles.

Present Conditions

This section begins at the intersection with Montana Avenue and Lyndale Avenue and continues east on Helena Avenue to the Burlington Northern Depot, then follows Railroad Avenue to Lamborn Street. The

proposed roadway would then be extended parallel to the B.N. tracks under the I-15 overpass. Approximately 0.7 miles east of I-15, the road would swing south on an existing roadway to intersect with U.S. 12, east of the Capitol interchange.

Helena and Railroad Avenues at the present time serve commercial property and facilities of the Burlington Northern Railroad.

Future Conditions

Functioning as a crosstown arterial, the street would attract a considerable amount of traffic. The 1990 traffic assignment to this proposal indicated volumes of over 12,000 ADT along portions of the route. A minimum four-lane section is recommended at least between Montana Avenue and Lamborn Street.

Recommendations

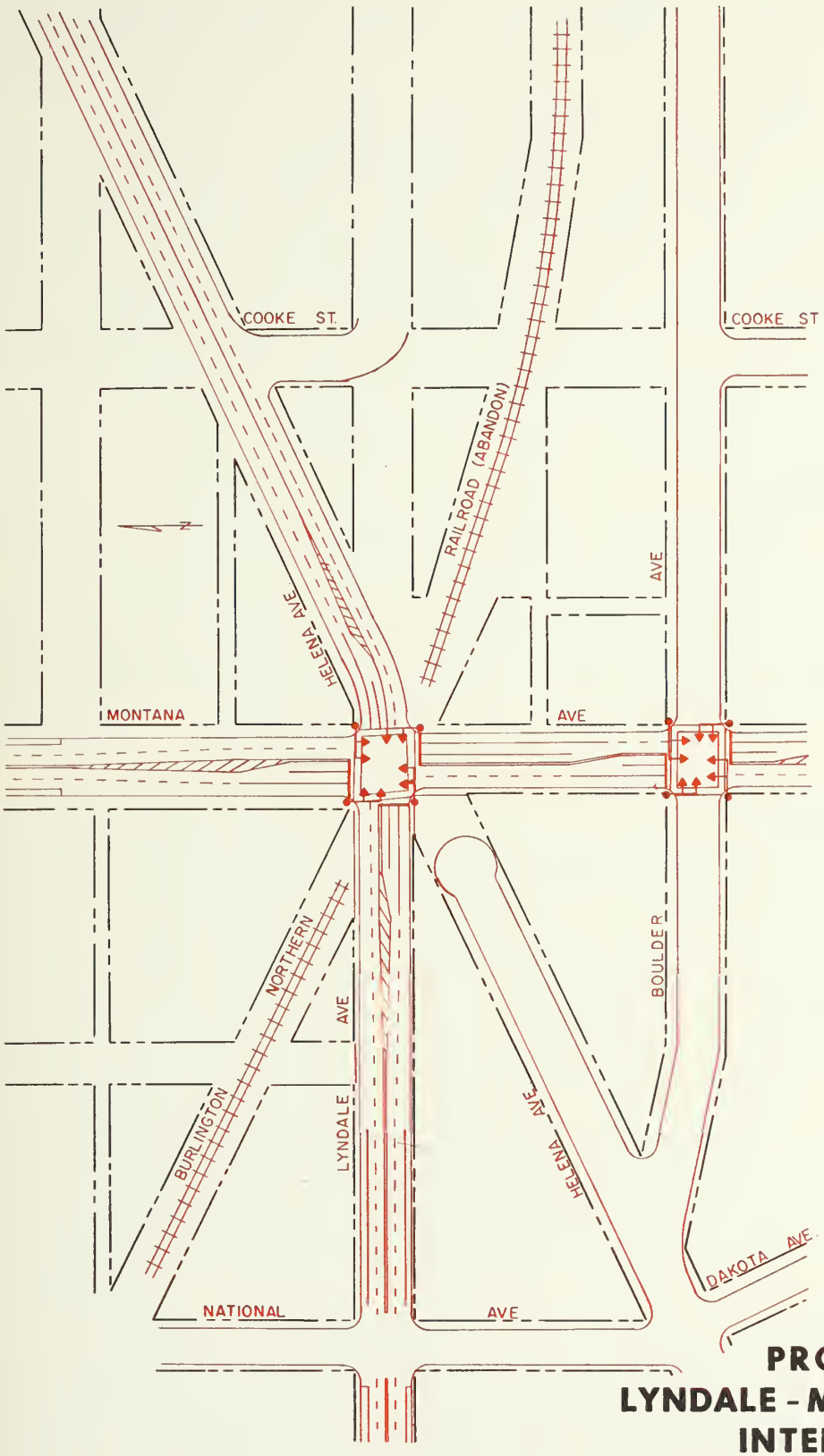
This proposal is intended to do several things, among them are:

1. Provide a safe efficient operation at the complex intersection of Montana, Helena and Lyndale Avenues. The intersection would be converted to a simple four-way intersection as indicated in Figure VII-9.

2. Provide a much needed crosstown arterial relieving the traffic on Montana Avenue between Lyndale and 11th Avenue and relieving the traffic along the length of 11th Avenue.

3. Provide a convenient truck access to the industrial areas along the Burlington Northern right-of-way.

4. Provide an alternate route for traffic from the southeast residential areas to the north and west. This is possible using Lamborn Street as a connection between Winnie Avenue and Railroad Avenue.



PROPOSED
LYNDALE - MONTANA AVES.
INTERSECTION

Fig. VII-9

PROJECT J - BROADWAY AVENUE

Warren Street to Montana Avenue. FAU route, 5816, 0.86 miles.

Present Conditions

The section from Park Avenue to Warren Street has been committed to construction under Urban Renewal funding. From Warren Street east to Montana Avenue, the street is in generally poor condition. Curb-to-curb width averages 35 feet and surfacing has deteriorated due to traffic loadings. Present traffic volumes vary along the street from 3,600 to 4,500 ADT. Volume/capacity ratios vary from 0.6 - 0.7.

Future Conditions

Urban renewal efforts in the CBD, and the expansion of the residential areas in the southeast section of the city will place a much higher demand on this particular street. Volumes will increase to the 11,000 - 12,000 ADT range between Park Avenue and Montana Avenue. Volumes east of Montana will vary from 2,500 - 6,500 ADT.

Recommendations

During the course of the study it became readily apparent that Broadway is a key link to the future development of Helena.

As an alternate to the reconstruction of Broadway between Warren Street and Montana Avenue the possibility of a one-way couplet was investigated. The most logical choice of streets to form a couplet in this area would be Broadway and 6th Avenue, both 5th Avenue and Breckenridge being excluded due to the poor terminal possibilities on either end.

An assignment of 1990 traffic to the couplet indicated loadings of approximately 7,000 vehicles per day on each leg of the couplet. This compares to the 11,000 to 12,000 vehicles on Broadway and 5,000 to 6,000 vehicles on 6th Avenue when operating as two-way facilities. Reconstruction

on Broadway is necessary in either case and may be necessary on 6th Avenue if used as part of the couplet.

Advantages of the couplet would be immediate, that is, a higher volume of traffic could be handled under present conditions without requiring additional right-of-way. However, there are traffic circulation problems in both the downtown area and residential areas south of Broadway that could cause a considerable amount of out-of-direction travel and driver confusion. The residential streets of Breckenridge, 5th Avenue and 8th Avenue would also feel the effects of higher traffic volumes that would be the result of traffic circulation within the couplet.

Extension of the couplet to the east, providing service to the hospital and developing residential areas, may also be difficult due to street offsets at the intersections of 6th and Lamborn and 6th and Hannaford.

The improvement of Broadway as a arterial street rather than the couplet is recommended. Although some immediate benefits may be derived from the implementation of the couplet, it appears that improvements on Broadway would provide a better long range solution to the east-west movement of traffic in this area. Broadway provides a very important link between the urban renewal area, the west side residential area and the expected development to the south and east. It also provides for a more ideal spacing of arterials, approximately six blocks south of 11th Avenue and Prospect, providing better service to the areas south of Broadway.

It is recommended that Broadway be reconstructed to a minimum forty-four foot section, Typical Section Number 4 on Figure VII-2. Such a roadway will provide a high capacity two-lane section with adequate parking

lanes. It also provides a possible means of expanding to a four-lane section with the removal of parking.

As an alternate to the reconstruction of Broadway to the forty-four foot section, it would be possible to obtain almost the same capacity by retaining the present width of the street and removing parking on one side only. This alternate would retain the boulevard feature and would require additional study as to which side of the street parking would be removed.

The intersection of Broadway and Montana is discussed as possible TOPICS project in Chapter VIII, Item 7.

PROJECT K - BENTON AVENUE

Euclid Avenue to Neill Avenue, FAU Rte. 5805, 0.31 miles.

Present Conditions

A two-lane facility with parking on both sides. Average daily traffic is 8,500 vehicles placing the street at capacity with a V/C ratio of approximately 1.0.

Future Conditions

The present ADT will more than double by 1990. This will require a minimum four-lane facility with the possibility that this type of facility would also be near capacity at the end of the study period.

Recommendations

Due to the present volumes, it is recommended that the street be converted to a minimum four-lane facility by the removal of parking with future consideration of widening the street to a more desirable section.

PROJECT L - BENTON AVENUE

Peosta Avenue to Euclid Avenue. Local Street, 0.20 miles.

Present Conditions

The street has no capacity problems at this time operating at a V/C ratio of less than 0.80, which provides a level of service C.

Future Conditions

An increase in volumes to 8,000 - 9,000 ADT will require that the section be widened to a four-lane facility. The continued expansion of residential areas to the north plus the increased activity at Carroll College accounts for a large percentage of this traffic increase.

Recommendations

With no major reconstruction, this facility could be converted to

a four-lane section. Typical Section Number 2 has been used to estimate a cost, however, Typical Section Number 3 could be utilized during an interim period.

PROJECT M - 6TH AVENUE

Spot improvement. This project is discussed in Chapter VIII, TOPICS, Item 16.

PROJECT N - LAMBORN STREET

Boulder Avenue to Railroad Avenue, FAU Rte. 5813, 0.11 miles.

Present Conditions

The street south of Boulder Avenue has been recently improved and appears capable of handling an increase in pasenger car volumes and light trucks. The street is functioning as a local access street with a present ADT of 1,000.

Future Conditions

Improvements to Helena and Railroad Avenues in accordance with the recommended plan will attract traffic to Lamborn Street to the extent that ADT volumes will exceed 6,000. Most of this traffic is diverted from Montana Avenue by the more convenient access via Lamborn, Helena and Railroad Avenues.

Recommendations

The 47 foot curb-to-curb width that exists south of Boulder Avenue should be extended an additional two blocks between Boulder and Railroad Avenues.

PROJECT O - JACKSON STREET

Sixth Avenue to 11th Avenue, FAU Rte. 5815, 0.26 miles.

Present Conditions

The ADT and relative importance of this street has increased in recent years. An older, narrow section, street widths vary between 27 to 40 feet, the majority of the section being unable to support two-lanes of traffic with parking. Present ADT is less than 2,000, operating at a V/C ratio of approximately 0.9. The high V/C ratio is partially due to the intersection with 11th Avenue where considerable back up does occur during both peak and off peak periods.

Future Conditions

Urban Renewal plans will channel more traffic onto this street. Traffic volumes will increase to 9,000 ADT, almost four times the present volumes.

Recommendations

The street needs to be improved to a standard comparable to the southerly section presently under construction. A typical section, similar to number 3 or 4, Figure VII-2, is recommended. It is further recommended that the north terminus of the street in the vicinity of 11th Avenue be revamped. The present T intersection in combination with the steep grades on 11th Avenue could not be tolerated under the higher volume conditions. A final design would be dependent on the status of one-way couplets on 11th and 13th Avenues.

PROJECT P - McHUGH LANE

Custer Avenue to Last Chance Gulch, local street.

Present Conditions

The street does not exsit at the present time.

Future Conditions

Residential build-up of the area along McHugh Lane, north of Custer Avenue, and the planned development of the area south of Custer Avenue makes this street a desirable addition to the system. Projected volumes vary from 3,700 to 5,500 ADT providing some relief to North Montana Avenue.

Recommendations

Typical Section Number 4 would provide an adequate facility for this proposed connection. The street should intersect at Custer Avenue directly opposite the existing intersection, so as to provide a direct flow of traffic across Custer Avenue. Future east-west streets intersecting McHugh Lane should also provide good sight distance and eliminate the necessity for any weave movements with east-west travel.

ADDITIONAL COMMENTS

In Table VII-2 the recommended arterial street projects are tabulated according to a recommended priority of development. The typical sections recommended for the arterials are shown in Figure VII-2. Typical layouts for median and left turn lanes for arterials are shown in Figure VII-3. As previously noted, most of the work proposed on the arterial system within the presently developed area consists of improvements to streets on existing locations. One exception to this, however, is the extension of Railroad Avenue between Fee Street and U.S. 12 in the vicinity of the tank farm. In this case, the easterly extension of the avenue would follow the present roadbed of the Butte branch of the old Great Northern Railway tracks, now the Burlington Northern. It is obvious that those priorities assigned to projects listed in Table VII-2 are subject to change. This is particularly true of those projects that

are influenced by the urban renewal activity. The extent of new facilities in this area will affect the volume of attracted and generated traffic. Such situations should be considered under the continuing phase of this study.

Collectors

Although collector streets do not have a prominent role in the recommended plan, it is necessary that some improvements be considered as a complement to the arterial street plan. Table VII-2 includes those projects that are on both the arterial and the present collector system. Figure VII-2 also includes typical sections that are equally applicable to the collector and local street system depending on traffic volumes and level of service desired. These typicals are shown in order to provide a correlative set of standards for streets of every classification.

CAPITOL COMPLEX

Long Range Development Plan

Figure VII-10 depicts a long range development plan that has been prepared for the Capitol area by the Architecture and Engineering Division of the Department of Administration for the State of Montana. Due to the closure of some of the surrounding streets, the plan will have some effect on the major streets in the immediate area. Figure VII-11 compares the 1990 traffic volumes of the recommended transportation plan with, and without the planned street closures in the Capitol area. The costs of implementing this long range plan in the Capitol area are not included in this study.

The change in assigned volumes do not indicate any change in the recommended system with the exception of Sanders Street. Due to the

closure of Roberts Street, Sanders would become the major access to the eastern perimeter of the capitol complex and become part of the major street system.

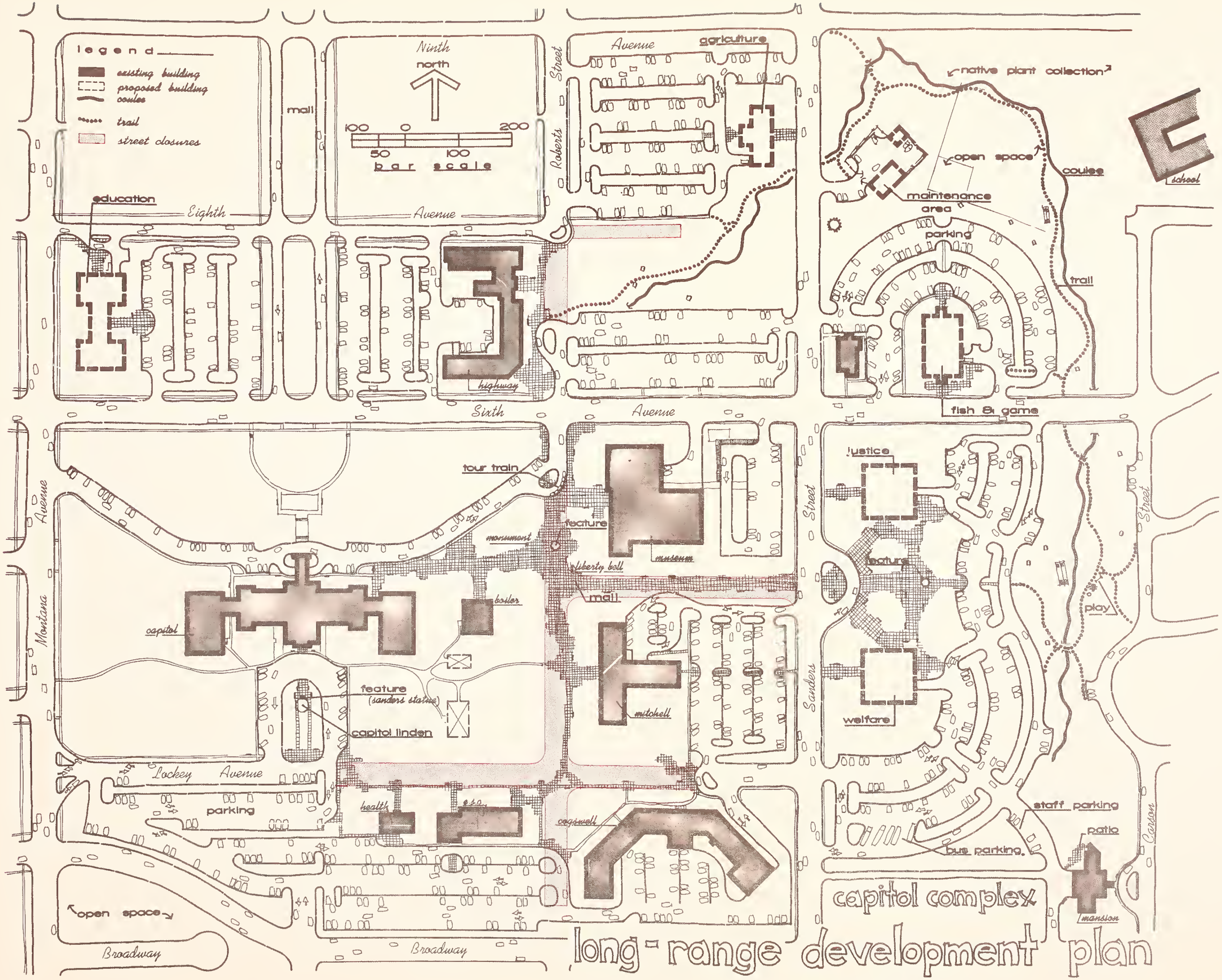
PLAN IMPLEMENTATIONS

The proposed major street and highway plan as developed by the Helena Urban Transportation Study was designed to: (1) provide adequate traffic service for expected 1990 travel demands; (2) be an aid to the further development of the study area; and (3) be a guide in the logical expenditure of public funds for improvements consistent with both immediate and long range needs. As these transportation needs do not recognize political boundaries, close cooperation between all levels of government is required to successfully implement the plan. To be effective, decisions that must be made at various intervals should always protect and further the best interests of the plan.

CONSTRUCTION PRIORITIES

As a guide for scheduling right-of-way acquisition, design and construction of the recommended improvements, immediate priorities were selected from the major street network. Generally, a crucial factor in constructing most projects is acquiring the required right-of-way which should be obtained as early as possible. Where this is not feasible, adequate setback lines should be used to provide for ease in design and construction of future improvements. Subdivision regulations are also a means of carrying out the implementation of the major street plan.

The total cost of the major street system improvements listed in Table VII-2, $12,324,900 and the total cost of the TOPICS projects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existing building
proposed building
coulee
trail
street closures
mall
Ninth
north
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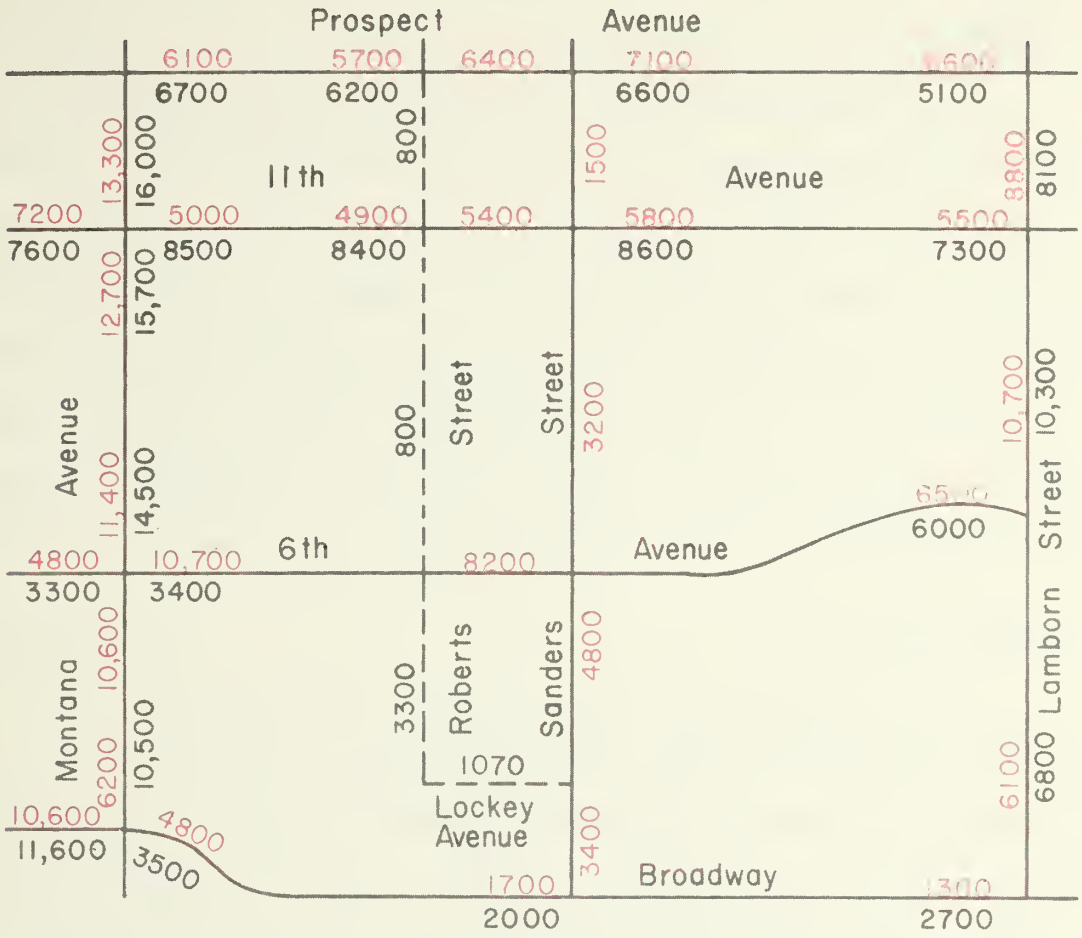
bar scale
Avenue
Eighth
education
Avenue
Sixth
highway
Street
Roberts
Avenue
agriculture
native plant collection
open space
coulee
maintenance area
parking
trail
school
fish & game
Avenue
tour train
feature
monument
liberty bell
museum
mall
boiler
capitol
feature (sanders statue)
capitol linden
mitchell
Lockey Avenue
parking
health
e.s.c.
cogswell
Montana
Avenue
Broadway
Broadway
open space
Street
Sanders
justice
feature
welfare
play
staff parking
patio
bus parking
mansion
Carson
capitol complex
long-range development plan

Fig. VII-10



LEGEND

0000 = INCLUDES FUTURE CAPITOL DEVELOPMENT

0000 = WITHOUT CAPITOL DEVELOPMENT

1990
TRAFFIC VOLUMES
CAPITOL AREA

Fig. VII-11

listed in Table VIII-2, $540,600 result in a total estimated cost of $12,865,500.

The ten projects ranked as an immediate priority, as shown in Figure VII-7 and listed in Table VII-2, are approximately sixty percent of the total estimated improvement costs of the system. As mentioned earlier, the priority array is flexible enough to meet available financing and current needs. As part of the continuing phase of this study, these priorities will be reviewed each year. Thus, if unforeseen changes have occurred, the order of construction for the various projects in the plan can be modified to fit the new conditions.

GENERAL FINANCING

In any program of public improvements perhaps the most critical factor is the availability of funds. Money for street and highway improvements in urban areas generally comes from several sources which include private developers, tax bills, street funds, bonds, state gasoline tax funds and various federal programs. In order to implement the major street plan, it will probably be necessary to utilize all available sources. However, it is not within the scope of this report to determine the most efficient means of financing the construction of the various projects. Adequate transportation is essential to the development and subsequent growth of any urban area.

The expenditure of state gasoline tax funds is dependent upon the availability of the various federal aid highway programs. This is so because federal highway funds must be matched with state gasoline funds at various and changing matching ratios. The Federal-Aid Highway Act of 1973 authorized the designation of urban routes in all cities of 5000 population and larger. In addition, this act authorized urban extension

routes to connect rural primary and rural interstate routes. Figure VII-12 is a map of the federal aid extension routes and the federal aid urban routes within the designated federal aid urban limits of Helena. Each of the federal aid systems has a specified allocation of federal aid funds available annually. Funds are obligated to the individual projects according to system and based upon priorities as approved by the Policy Coordinating Committee. This committee consists of the Mayor, Chairman of County Commissioners, Prsident of City Planning Board, Administrator of Engineering, Department of Highways and Division Engineer, Federal Highway Administration.

SURVEILLANCE

It is desirable to have a systematic program, designed to furnish information about the development taking place in the Helena planning area. Such a program, known as a surveillance program, would be primarily geared to the collection, storing and analysis of data pertinent to socio-economic and transportation changes in the area. A continually updated data base is needed to support the periodic update and revision of plans.

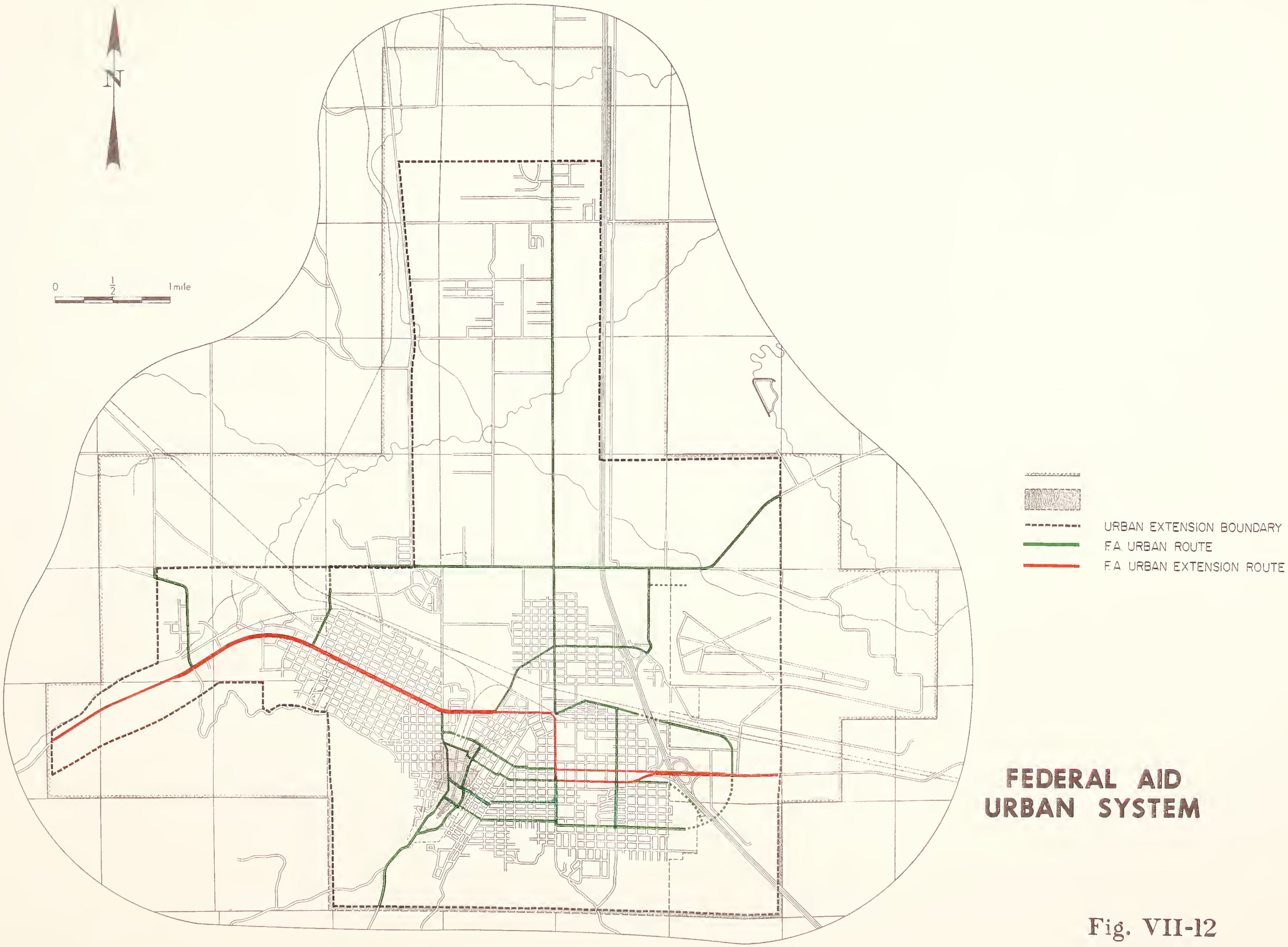
An agreement between the local governmental agencies and the Montana Department of Highways has been executed and is currently in effect. Under this agreement a Policy Coordinating Committee and Technical Advisory Committee have been organized and are now meeting regularly. The service element, a main objective of continuing planning, will become more effective in providing needed planning data and assistance to those responsible for plan implementations.

REVIEW

Each year the Policy Coordinating Committee will meet to review the

the results of the surveillance program. This yearly review will accomplish several objectives: (1) determining whether observed growth is compatible with the land use plan; (2) determining general level of traffic service; (3) determining the progress in implementing the transportation plan; and (4) determining if changes should be made in the initial selection of immediate priority projects. In this manner, the various governmental units should be able to intelligently make decisions that will further the interests of the plan.

A secondary purpose of the yearly review is to keep the public informed of the accomplishments, not only in implementing the transportation plan, but in all elements of the Comprehensive Plan. This is doubly important in that the people have a two fold interest as both users and taxpayers.



FEDERAL AID URBAN SYSTEM

Fig. VII-12

CHAPTER VIII

TOPICS

Chapter VIII

T O P I C S

HELENA TOPICS

The TOPICS Program has been described as an "urban traffic operations program to increase capacity and safety". It is designed to be a program of reducing traffic congestion and facilitating the flow of traffic over a network of arterials and other major streets within an urban area. The TOPICS program is intended to "maximize the efficiency of the existing street system" without major construction or reconstruction.

Among the many traffic engineering measures that can be applied on existing streets are improved signal operations, additional turning lanes at signalized intersections, turning movement controls, parking restrictions, signing and delineation, channelization, one-way street operations, street lighting, pedestrian controls, speed limit controls, and stricter enforcement of regulations. With these available techniques for increasing operations capabilities, it is readily apparent that traffic engineering and transportation planning are closely interrelated.

Several of the discussions and recommendations of this chapter are an outgrowth of data presented in Chapter III, "Transportation Facilities".

TOPICS funds have already been utilized for improvements at four of Helena's intersections. For a contract bid price of $96,970 the

following listed intersections are being improved:

1. Neill - Park - Benton Avenues
2. Lyndale Avenue - Main Street
3. 11th Avenue - Rodney Street
4. Montana Avenue - Cedar Street

Further analysis of these intersections, in their completed stage, indicates that some deficiencies may still exist. These deficiencies will be further discussed in later paragraphs.

ACTIONS FOR CAPACITY DEFICIENT INTERSECTIONS

Since signalized intersections generally establish the overall capacity of each street, an analysis of capacity deficient intersections and general remedial type improvements will be discussed in this section.

When the tolerable capacity level at an intersection is exceeded, one or more of the following measures is usually needed: (1) Revision of traffic controls and regulations; (2) Improvement in signal operations; (3) Modification of physical features of the intersection; (4) Improvement in the existing route and/or provision of an alternate facility.

The first two measures can usually be implemented at nominal cost. Signal operations can be improved by adjustment in timing or, in some instances, by adding additional phases. Revision of traffic controls and regulations involves one or more of the following measures: (a) Elimination of parking; (b) Removal of lateral clearance restrictions; (c) Restriction of turning movements; (d) One-way operation; (e) Unbalanced flow; (f) More rigid enforcement of regulations.

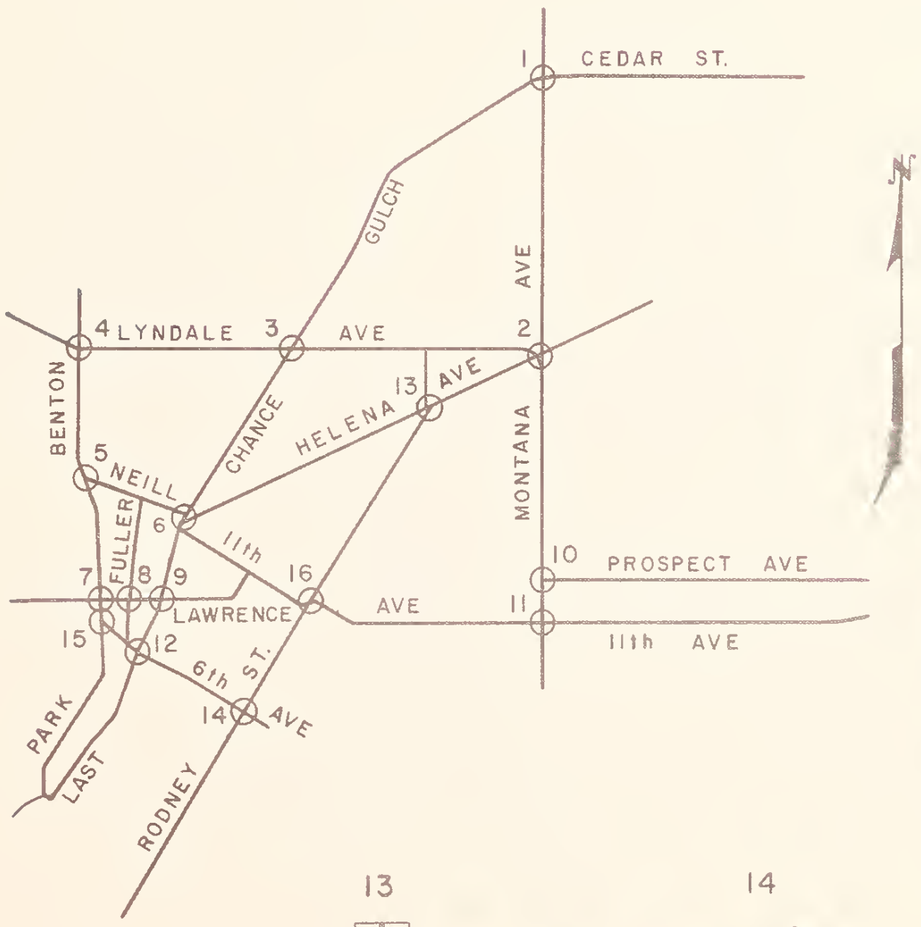
The third measure usually requires moderate expenditure of funds and typically involves these types of betterments: (a) Upgrading of

1970 HELENA URBAN TRANSPORTATION STUDY

EXCEEDING V/C RATIO OF 1.00

RESERVE CAPACITY

VOLUME OF TRAFFIC



1

MONTANA - CEDAR

2

MONTANA
LYNDALE - HELENA

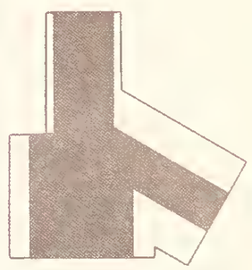
3

LAST CHANCE GULCH
LYNDALE

4

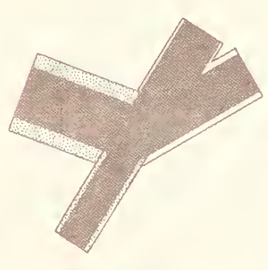
BENTON - EUCLID
LYNDALE

5



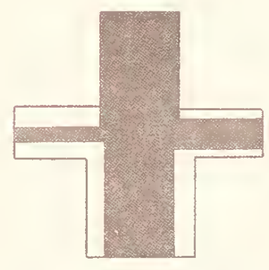
PARK - NEILL
BENTON

6



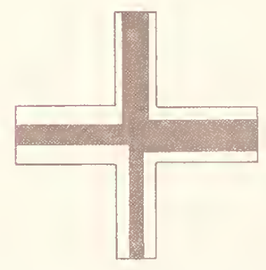
LAST CHANCE GULCH
HELENA - NEILL

7



PARK - LAWRENCE

8

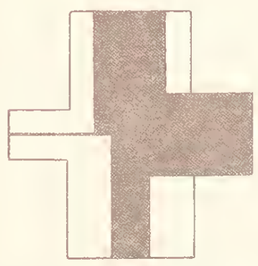


FULLER - LAWRENCE

9

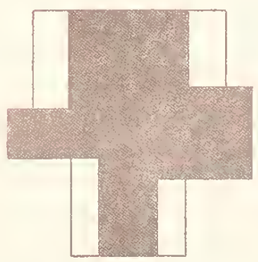
LAST CHANCE GULCH
LAWRENCE

10



MONTANA - PROSPECT

11



MONTANA - 11th AVE

12

LAST CHANCE GULCH
6TH AVE

13

RODNEY - HELENA

14

RODNEY - 6th AVE

15

PARK - 6th AVE

16

RODNEY - 11th AVE

MAJOR INTERSECTION APPROACHES PEAK HOUR VOL/CAP

Fig. VIII-1

signalization; (b) Simple channelization; (c) Additional turning lanes; (d) Improvement of street lighting; (e) Resurfacing of intersection; or (f) Reconstruction of entire intersection.

If one or a series of signalized intersections along a route are capacity deficient, often more extensive improvements involving major expenditures may be required. Resurfacing, widening, or reconstruction of the existing or adjacent streets and/or provision of a new paralleling facility may be necessary to satisfy the fourth measure.

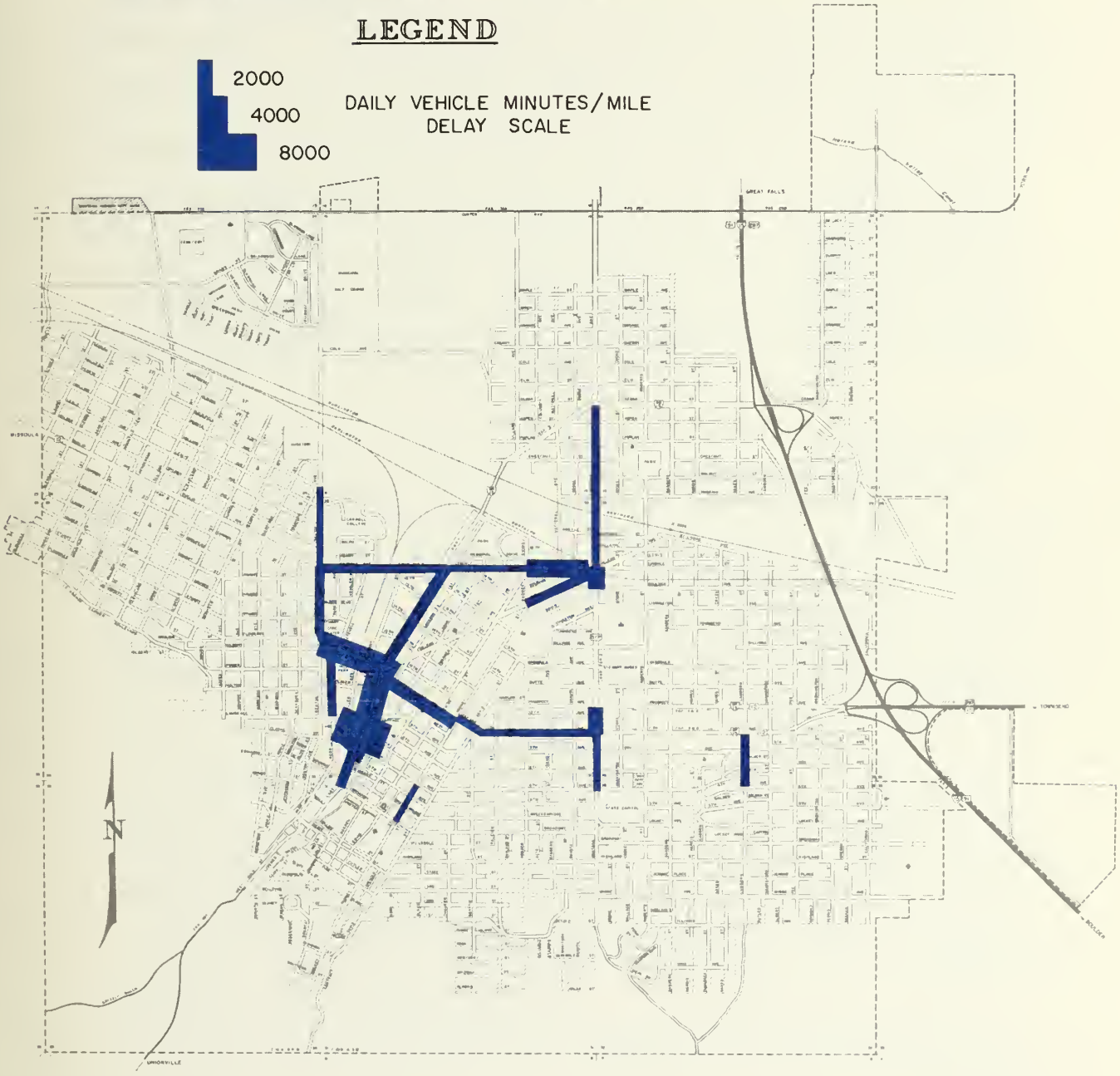
LOCAL CAPACITY STUDY FINDINGS

The capacity study findings, which were discussed in the "Transportation Facilities" chapter, indicated that only 11 of the 58 intersection approaches analyzed did not meet "Level of Service C" criteria. The locations of these intersection approaches are identified in Figure VIII-1. All 11 intersections were determined to be capacity deficient, below "Level of Service C", and will require various remedial actions to relieve the congested situations. These 11 intersection approaches, with related traffic data are listed in Table IV-5 of Chapter IV. Recommended measures to improve the 11 intersection approaches are included in Table VIII-1. A delay rate analysis within the city limits is shown by Figure VIII-2.

ACCIDENT ANALYSIS

The portion of the "Transportation Facilities Chapter dealing with the accident study identified the number of accidents by intersection and indicated a rate by control section. Accidents occurring outside the city, within the study area, were also listed.

1970 HELENA URBAN TRANSPORATION STUDY



DELAY RATE ANALYSIS
(PEAK HOUR)

Fig. VIII-2

Since intersections present the greatest area of traffic conflict and accident occurrence, the citys' major street system was reviewed to determine the predominant causes of accidents at these critical points. Those major intersections listed in Table IV-7 having 5 or more accidents per year were evaluated. A collision diagram for each of the ten intersections is shown in Figures VIII-3 through VIII-12. Additional collision diagrams are shown for those intersections where improvements have been recommended based on other than accident experience. These diagrams are shown in Figure VIII-13 through VIII-18. Recommendations for improvements, including the intersections above, are also listed in Table VIII-1.

TRAFFIC SIGNALS

Of the seventeen signalized intersections in Helena, eleven are semi-actuated and six are pretimed. None are interconnected. Locations of these signals are shown in Figure IV-2. There are also two pedestrian crosswalk flashers located midblock and seven school flashers, some are pedestrian actuated.

Most of the existing signals do not meet the standards specified by the Manual of Uniform Traffic Control Devices. Many do not have the standard dual indication as is now required, others have substandard lens where higher operating speeds prevail. In general, extensive revamping of the existing signals will be necessary to meet standard requirements including the removal of some installations that are not warranted.

Table VIII-1 lists the status of those areas where TOPICS improvements have been implemented plus additional areas where TOPICS type improvements are recommended. Estimated costs for the proposed TOPICS

projects are shown in Table VIII-2 as well as a priority array as established by city officials.

LAWS AND ORDINANCES

Title X of the Municipal Code of Helena is known as the Helena Traffic Code. Title X specifies types of vehicles, public and private ways, intersections, crosswalks, safety zones and traffic control devices. Section 10-3-1 authorizes the Chief of Police to install and maintain all traffic control devices. This authority was evidently placed with the Chief of Police in the absence of a traffic engineering department within the city government.

In recent years, however, through the cooperative efforts of the NHTSA[1] City-County, a full-time traffic engineer has been employed. His area of authority is somewhat indefinite within the city limits since he also serves Lewis and Clark County. It is suggested that his authority be extended to include all traffic engineering functions within the city limits. This action would help meet the requirements of paragraph 96 of PPM 21-18 as issued by FHWA on the TOPICS program.

Sections 10-3-4 and 10-3-5 of Title X cover all traffic control devices and require adherence to present state law governing such devices. This should place the criteria for all such traffic control devices in conformance with the Uniform Manual since the Department of Highways has officially adopted the 1971 edition.

Section 10-9-3 designates the through and stop streets in the city. It would also be of value if the functional classification were included to aid in determining the hierarchy of the system.

Title XI is known as the "Zoning Ordinance" for the City of Helena

[1]National Highway Traffic Safety Administration

and incorporates off street parking and loading operations as well as general sign regulations.

Generally, the existing codes and ordinances are quite comprehensive and useful tools for administrative and enforcement functions. Only minor changes as suggested above should be necessary.

TECHNICAL CAPABILITIES

The City of Helena is presently capable of developing a continuing traffic operations program. The Engineering Department is composed of a City Engineer, and Assistant City Engineer and is supported by a complement of engineering technicians for both field and office work. The Urban Renewal effort and Model Cities also contribute to the basic engineering capabilities of city government. However, it appears that the city-county traffic engineer could provide more service to the area if his scope of authority was broadened as noted in the paragraph covering "Laws and Ordinances".

The city does maintain a sign shop and an electrician in charge of signal installation and maintenance. It appears that the city has adequate staff to ensure proper maintenance of existing and future traffic signal installations.

EVALUATION

In the future certain completed TOPICS projects will be selected for evaluation. Procedures have not yet been detailed, however, it is assumed that the evaluation will cover significant segments of the areas

improved.

The common method of evaluation is the standard "before versus after" study which compares changes in travel time, delay and accident frequency. Figure VIII-27 is a suggested format for presenting evaluation data.

FUTURE FUNDING OF TOPICS

Under the 1973 Federal Highway Act, separate funding for TOPICS type projects was discontinued. Proposed TOPICS type projects can, however, be financed with either Urban System Funds or Urban Extension Funds.

Table VIII-1

STATUS OF TOPICS PROJECTS INCLUDING RECOMMENDATIONS FOR ADDITIONAL PROJECTS

1. Neill-Park-Benton Avenues T-9058(1)

   Project completed.

2. Lyndale-Last Chance Gulch T-9058(1)

   Problem: Although this intersection is under contract as a topics improvement and is essentially complete, a congested situation still exists on the west approach during peak hours. The intersection is also experiencing an increase in volumes on the south approach desiring to turn left onto Lyndale.

   Capacity: The west approach and east approach are operating at a Level of Service E and D, respectively. Volume capacity ratios vary from 0.83 to 1.32 during peak hours. Recent observations also indicate an increase in the left turn volumes on the south approach. Since this movement does not have a separate signal indication it is possible that the Level of Service has been lowered during the evening peak.

   Accidents: Sixteen reportable accidents have occurred at this intersection during the past three years. No definite pattern exists other than the rear end types. The small number of turning movement accidents should be further reduced due to the protected left turn movements on Lyndale that have been incorporated into the recent TOPICS project. A collision diagram is shown in Figure VIII-10.

   Recommended Improvements: Additional experimentation with cycle times, including the leading left turn phase, may allow a more efficient metering of traffic. Possible extension of the length of the left turn lanes on all approaches would also allow through movements on the inside lane to move instead of being delayed by a vehicle waiting to enter the left turn storage lane. See Figure VIII-19.

3. 11th Avenue-Rodney Street T-9058(1)

   Project completed.

4. Montana Avenue-Cedar Street T-9058(1)

Project completed.

5. Montana-Lyndale-Helena Avenues

Problem: The complex geometrics of this five legged intersection are further complicated by the Burlington Northern Railroad bisecting the entire intersection. The location of the Boulder Avenue-Montana Avenue intersection also creates problems due to the back up of vehicles through the intersection and the left turns from north to east on Montana where very little storage is available.

Capacity: Only the north intersection shows a capacity deficiency operating at a Level of Service E during peak hours. The remainder of the approaches operate between levels of Service A and C although the south approach is close to an operating level of D.

Accidents: The combination of accidents between this intersection and the intersection of Boulder and Montana Avenues rank this area as the highest accident location in the city. Forty accidents have been reported for the two intersections for the three year reporting period with twenty-nine occurring at Boulder and Montana. Most of these are a result of the congestion occurring at the Montana-Helena and Lyndale intersection, that backs up traffic through the Boulder and Montana intersection. The absence of signalized intersections immediately south of this location does not allow adequate gaps for vehicles entering from Boulder to cross Montana or join the traffic on Montana. Figures VIII-3 and VIII-4 indicate the high number of right angle collisions.

Recommended Improvements: Although a long range proposal for alleviating most of the problems at this intersection are discussed in Chapter VII, "Recommended Transportation Plan", it is possible to reduce the capacity problem at the north approach with a TOPICS type improvement. Figure VIII-20 indicates a possible solution, including signals at the Boulder and Montana intersection.

6. Montana-Boulder Avenues

Problem: As discussed in Project 5, this intersection suffers from an accident problem and is also a victim of capacity problems created by the Montana-Lyndale-Helena Avenue intersection.

Capacity: Capacity is affected by the back up of vehicles on the south approach of the Montana-Lyndale-Helena intersection. This storage problem also affects the southbound left turn from Montana on to Boulder Avenue which has a fairly heavy movement to the Senior High School.

Accidents: Twenty-nine accidents, as discussed above, during the three year reporting period. Figure VIII-3.

Recommended Improvements: Figure VIII-20 also indicates a possible solution to the problems at this intersection. The signals at this location must coordinate fully with the Montana-Lyndale-Helena Avenue intersection.

7. Broadway-Montana

Problem: East-west arterial movements on Broadway are inconvenienced by the offset in the street at the intersection with Montana Avenue. Montana Avenue traffic must also tolerate the merge-weave movement that occurs for Broadway traffic to continue east or west.

Capacity: Capacity is presently not a problem at this intersection.

Accidents: Accidents do not appear to present a serious problem, although the improvements in the urban renewal area at the west terminus of Broadway will create more traffic on Broadway and consequently a higher exposure rate.

Recommended Improvements: Realigment of Broadway as indicated in Figure VIII-21 would increase both the capacity and safety of the intersection. The extent of the improvement would be dependent on the availability of R/W.

8. Montana-Prospect-11th Avenues

Problem: These two intersections presently form the western terminus of the 11th Avenue-Prospect Avenue couplet and are treated as a single operating unit due to the short separation of the two intersections along Montana Avenue. Capacity and accidents are a problem on two of the approaches.

Capacity: With the exception of the east approach at the Montana-Prospect intersection and the west approach at the Montana-11th Avenue intersection the unit is operating above the established level of service criteria. Table IV-4 indicates the respective levels of service.

Accidents: Both intersections are averaging more than six reportable accidents per year. The high volume of left turning traffic is the cause of half the accidents occurring at the Montana-11th Avenue intersection with the balance rear-end collisions. The accidents at the Montana-Prospect Avenue intersection are predominantly of the rear-end type. Shown in Figures VIII-5 and VIII-6.

Recommended Improvements: Figure VIII-22 shows a possible solution to some of the problems involved with the termination of the couplet on the high volume Montana Avenue. The extension of the couplet one to three blocks further west will improve the following situations:

1. The weave movement created by west bound traffic from Prospect to 11th will be moved west to a low volume street.

2. The outside southbound lane on Montana would function as a through traffic lane eliminating the tie-up of through traffic that has been caused by the double left turn lane that is necessary for this heavy movement.

3. The narrow 11th Avenue approach would function more effectively as a one-way approach eliminating some of the hazards presently created by two-way operation.

4. Intersections would clear more rapidly there by allowing more green time to be assigned to the heavier movements. Progression through the intersections would also be more efficient.

9. Benton-Lyndale-Euclid

Problem: The intersection operates reasonably well with the exception of the number of turning movement accident that account for half the accidents occurring at the intersection.

Capacity: Capacity is no problem, all approaches are operating above the level of Serivce C criteria.

Accidents: Most of the turning movement accidents involve the left turn from the west approach on Euclid Avenue to the north on Benton Avenue. The demand for this particular movement has increased in recent years with the expansion of Carroll College and the increased residential build up north of the College. Figure VIII-4 indicates the problem.

Recommended Improvements: The improvement possibilities for this problem are quite limited. The intersection operates reasonably well and no capacity deficiencies are presently evident. It is possible that an additional phase for the west to north movement could be incorporated, however, this is possible only at the sacrifice of the balance of the intersection operational movements.

10. Last Chance Gulch-Lawrence

Problem: A safety problem is evident from the number of reported accidents summarized in Table IV-7.

Capacity: No capacity problems are evident. The intersection operates at a high level of service with occasional pedestrian interference creating the only operational problems.

Accidents: The high incidence of rear-end collisions and the extent of the right angle collisions are cause for concern at this particular intersection. Figure VIII-8 is a collision diagram for this intersection.

Recommended Improvement: The poor signal installation at this major downtown intersection are considered to be the prime contributors to the high accident rate. Signals are not in conformance with the UMTCD and are not visible to vehicles approaching from the north beyond the first vehicle. Pedestrian signals are also inadequate with no proper clearance interval. It is recommended that a detailed investigation be made into the effects of the pedestrian crosswalks immediately south of this intersection at the intersection of Last Chance Gulch and 7th Street. It is possible that a signal at Last Chance Gulch and 7th Street would provide a more positive control for both pedestrians and vehicles and provide for a smoother flow of traffic through this area.

11. Park-Lawrence

Problem: The intersection appears to suffer from operational difficulties due in part to the existing non-uniform signal installation.

Capacity: Due to the one way operation on Park Avenue there is presently no capacity problem. All approaches are at or above level of service C.

Accidents: The predominant type of accident at this location involves turning movements. Figure VIII-9 is a collision diagram for this intersection.

Recommended Improvements: The non-standard signals should be replaced with a modern installation including pedestrian walk-wait indication. Additional investigation should also include the intersection of 6th Avenue and Park Avenue due to its close proximity and the weave movements that occur between the two intersections.

12. Roberts Street-11th Avenue

Problem: This intersection is experiencing an increase in accidents each year as traffic volumes increase. Excessive delay in entering or crossing 11th Avenue is also evident on the Roberts Street approaches.

Capacity: Capacity does not appear to be a problem except on the Roberts Street approaches when continuous traffic on 11th does not allow openings for crossing traffic, pedestrian or vehicular.

Accidents: Almost all accidents involve turning movements or crossing movements. The intersection is experiencing an average of five accidents per year. Figure VIII-11 is a collision diagram of the intersection.

Recommended Improvements: Since Roberts is expected to be closed off as part of the Capitol Complex Long Range Development, it is recommended that this intersection be improved by providing larger right-turn curb radii and providing two approach lanes for Roberts Street. Traffic signals have been approved for 11th Avenue and Saunders.

13. Prospect-Lamborn

Problem: This intersection is experiencing an increase in traffic volumes and accidents and it appears that the volumes will continue to increase on both streets. Almost eighty percent of the Lamborn traffic approaches from the south with seventy percent of this traffic turning left to continue west on Prospect.

Capacity: Capacity is no problem due to one-way operation on Prospect.

Accidents: Accidents are increasing as can be seen by Figure VIII-12. The intersection is averaging five accidents per year and is the tenth highest accident location within the city limits.

Recommended Improvements: Traffic signals have been approved for this intersection and the intersection of Lamborn and 11th Avenue.

14. Last Chance-Helena-Neill - F-9999(7) Under Contract

Problem: All approaches are operating below level of service C. This is due to the extreme angle of the Helena Avenue approach and the traffic patterns that require a three phase signal.

Capacity: Table IV-4 indicates the level of service for the four different approaches.

Accidents: The accidents are not a serious problem, eleven accidents being reported over the three year analysis period, as shown in Figure VIII-16.

Recommended Improvements: The present signal indication is an outdated fixed time installation that should be replaced with a modern actuated facility. Green indications that are traffic adjusted would add to the capacity of the intersection. In addition to the new signal installation, it is recommended that the geometrics of the intersection be modified to better delineate the lane use and allow for easier turning movements. Figure VIII-24 indicates some of the possible modifications of this intersection and the intersection of 11th Avenue and Last Chance Gulch.

15. Last Chance Gulch-6th Avenue

Problem: No serious problems are evident other than the low service volume on the east approach.

Capacity: Due to the narrow approach width and the high percentage of left turns, (26 percent on the east approach), the level of service of the particular approach is less than Level of Service C.

Accidents: No serious accident problem is evident with an average of three accidents per year being reported at this intersection, as shown in Figure VIII-13.

Recommended Improvements: Due to the fact that all signal installations in the CBD are outdated with inadequate indication or control, it is recommended that this location also be brought up to date with a new signal installation. Although future urban renewal plans will make considerable change in the operation of this intersection it is suggested that a controller be installed that will provide for a leading left turn phase, as shown in Figure VIII-25.

16. 6th Avenue-Davis-Rodney Streets

Problem: The adverse curvature at the intersection of 6th and Davis creates a hazard due to the restriction in sight distance and also acts as a bottleneck due to the narrow street width at the most critical part of the reverse curve.

Capacity: Capacity is no problem at the intersection at the present time. This is due in part to the restricted movements on Davis Street.

Accidents: During the three year period, 1969 through 1971, five accidents were reported at the intersection of Davis Street and 6th Avenue. Four of these accidents were a result of the narrow, curved roadway during icy conditions. Ten accidents occurred at the intersection of Rodney Street and 6th Avenue during the same period. Four of the accidents involved turning movements, the remainder being rear-end type. Collision diagrams are shown in Figures VIII-17 and VIII-18.

Recommended Improvements: Figure VIII-26 is a sketch of the type of improvement recommended for this location. Additional right-of-way is necessary to implement this type of improvement.

Table VIII-2

COST SUMMARY OF PROPOSED TOPICS PROJECTS

Priority	Street or Highway	Nature of Project	Estimated Cost
1	Montana-Lyndale-Helena Avenues	Intersection improvement upgrade signals-turn lane	$ 17,500
1	Montana-Boulder Avenue	New signals	$ 15,000
2	Broadway-Montana Ave.	Remove jog at intersection	$124,000
3	Montana-Prospect 11th Avenues	Extend couplet and revise signals and pavement markings	$ 23,600
4	6th-Davis-Rodney Street	Remove jog at intersection of 6th & Davis-replace signals at 6th & Rodney	$229,000
5	Last Chance-Lawrence	Upgrade signals	$ 12,750
5	Fuller-Lawrence Street	Upgrade signals	$ 12,750
5	Park-Lawrence Park-6th Ave.	Upgrade signals	$ 22,750
NR*	Lyndale-Last Chance Gulch	Extend left turn lanes	$ 1,500
NR	Benton-Lyndale Euclid Avenues	Improve signal phasing and pavement markings	$ 2,000
NR	Roberts-11th Avenue	Minor Improvements	$ 2,000
NR	Prospect-Lamborn Street	New Signals	$ 30,000
NR	Last Chance-Helena-Neill Avenues	Upgrade signals and revise geometrics	$ 35,000
NR	Last Chance-6th Avenue	Upgrade signals	$ 12,750
		Total Estimated Cost	$540,600

*NR indicates no priority assigned, "not ranked".

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Montana Ave. AND Boulder Ave.

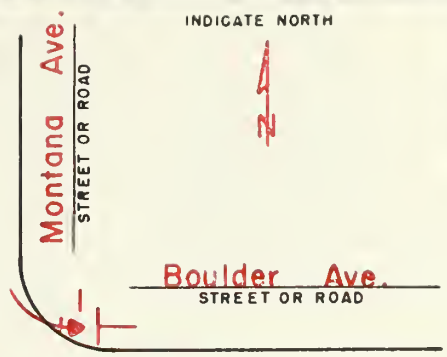
HIGHWAY NUMBER

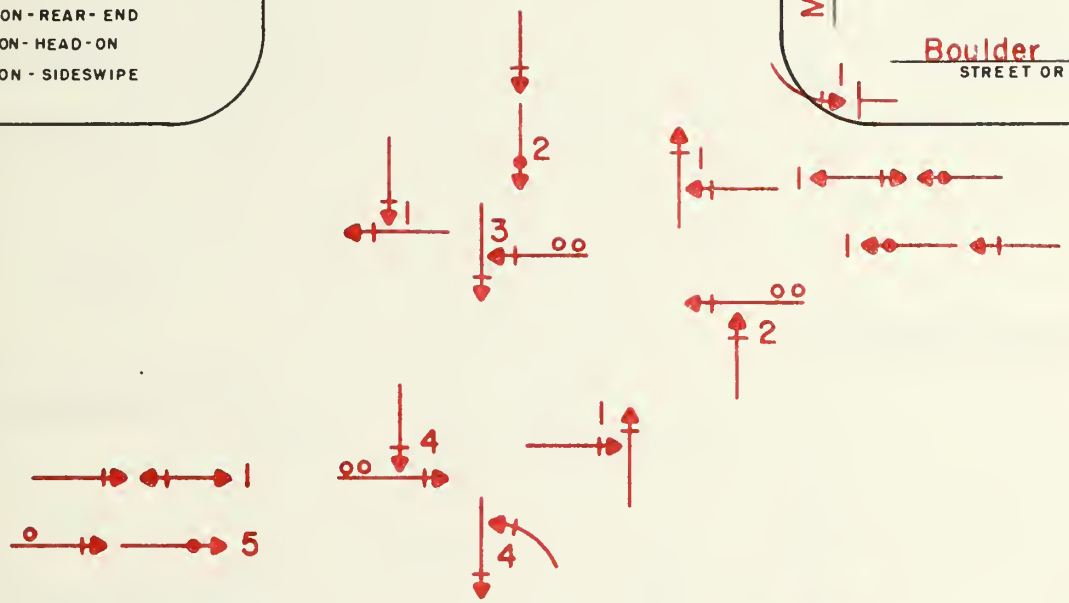
PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE

LEGEND

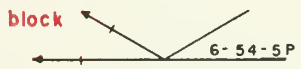
- PASSENGER KILLED
- PEDESTRIAN KILLED
- PASSENGER INJURED
- PEDESTRIAN INJURED
- PROPERTY DAMAGE ONLY
- COLLISION - REAR - END
- COLLISION - HEAD - ON
- COLLISION - SIDESWIPE





- PATH OF PEDESTRIAN
- PATH OF VEHICLE
- PATH OF ANIMAL
- VEHICLE MOVING
- VEHICLE STOPPED
- VEHICLE BACKING
- PROPERLY PARKED
- IMPROPERLY PARKED
- VEHICLE OVERTURNED
- VEHICLE SKIDDED

EXAMPLE



COLLISION - SIDESWIPE
JUNE, 1954 - 5-6 PM
PROPERTY DAMAGE

NOTE LOCATION OF ANY TRAFFIC CONTROLS AT INTERSECTION BY THE FOLLOWING SYMBOLS

- STOP SIGN
- TWO WAY TRAFFIC SIGNAL
- FOUR WAY TRAFFIC SIGNAL

COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		3	9	12
HEAD - ON				
REAR - END		2	7	9
SIDESWIPE				
TURNING MOVEMENT			4	4
PARKING				
NON - COLLISION				
FIXED OBJECT			2	2
PEDESTRIAN				
BACKING			2	2
MISC.				
TOTAL		5	24	29

REMARKS

Fig. VIII-3

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

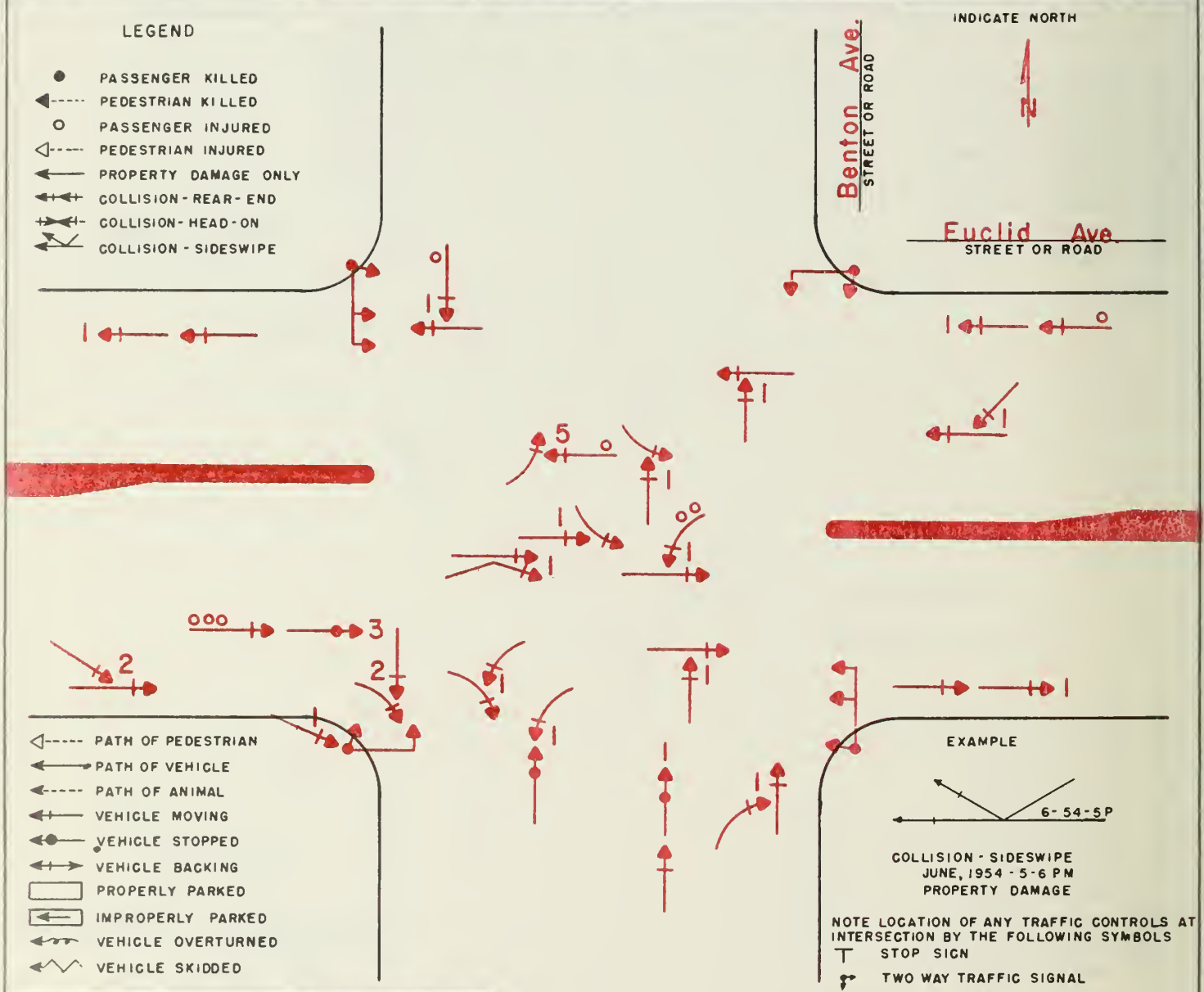
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Euclid Ave. AND Benton Ave.

HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		1	2	3
HEAD - ON			1	1
REAR - END		2	5	7
SIDESWIPE			5	5
TURNING MOVEMENT		2	9	11
PARKING				
NON - COLLISION				
FIXED OBJECT			1	1
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		5	23	28

REMARKS

Fig. VIII-4

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

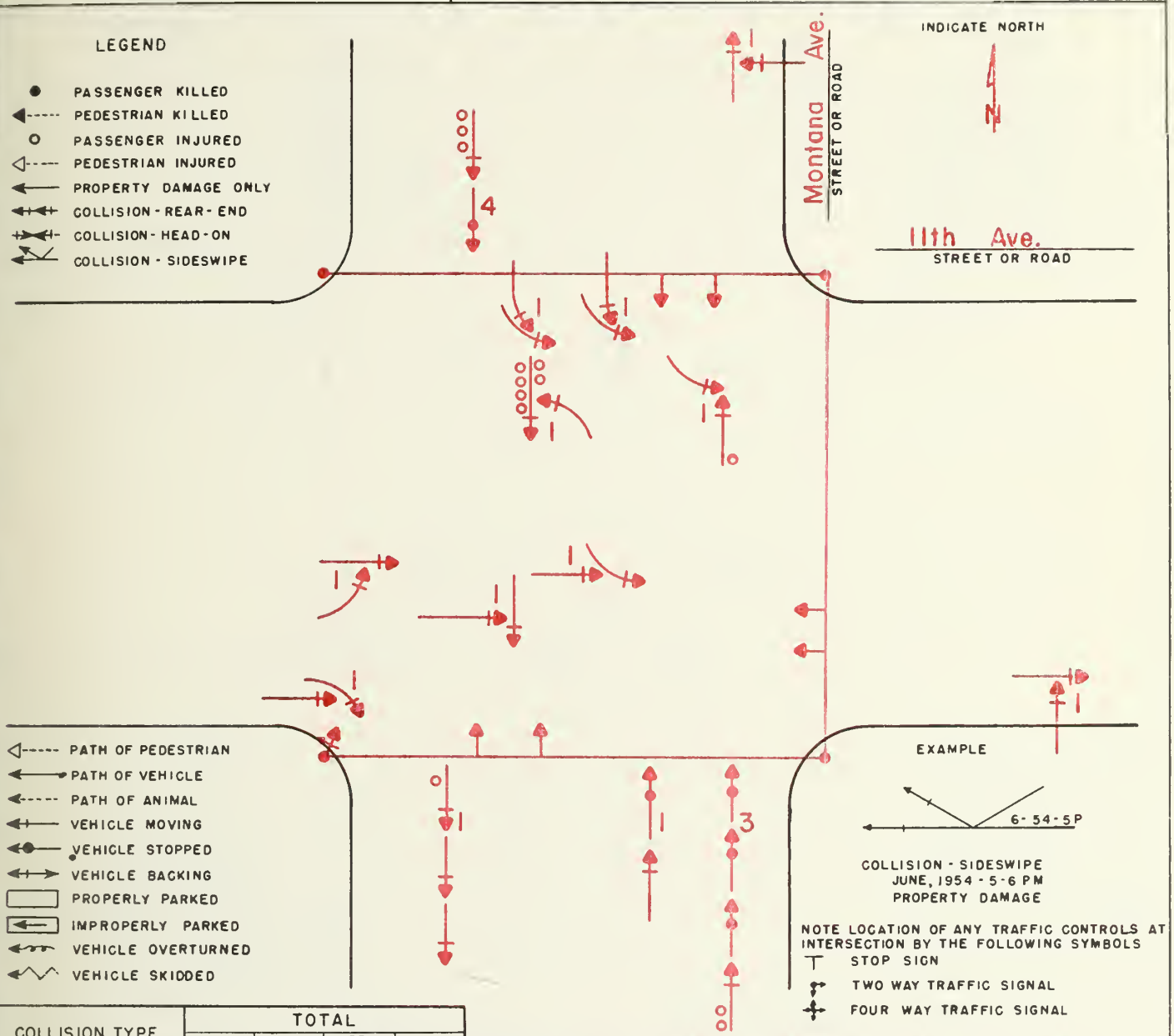
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Montana Ave. AND 11th Ave.

HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE			3	3
HEAD - ON				
REAR - END		4	5	9
SIDESWIPE				
TURNING MOVEMENT		2	5	7
PARKING				
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		6	13	19

REMARKS 11th Ave. is one-way East bound from Montana Ave.

Fig. VIII-5

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

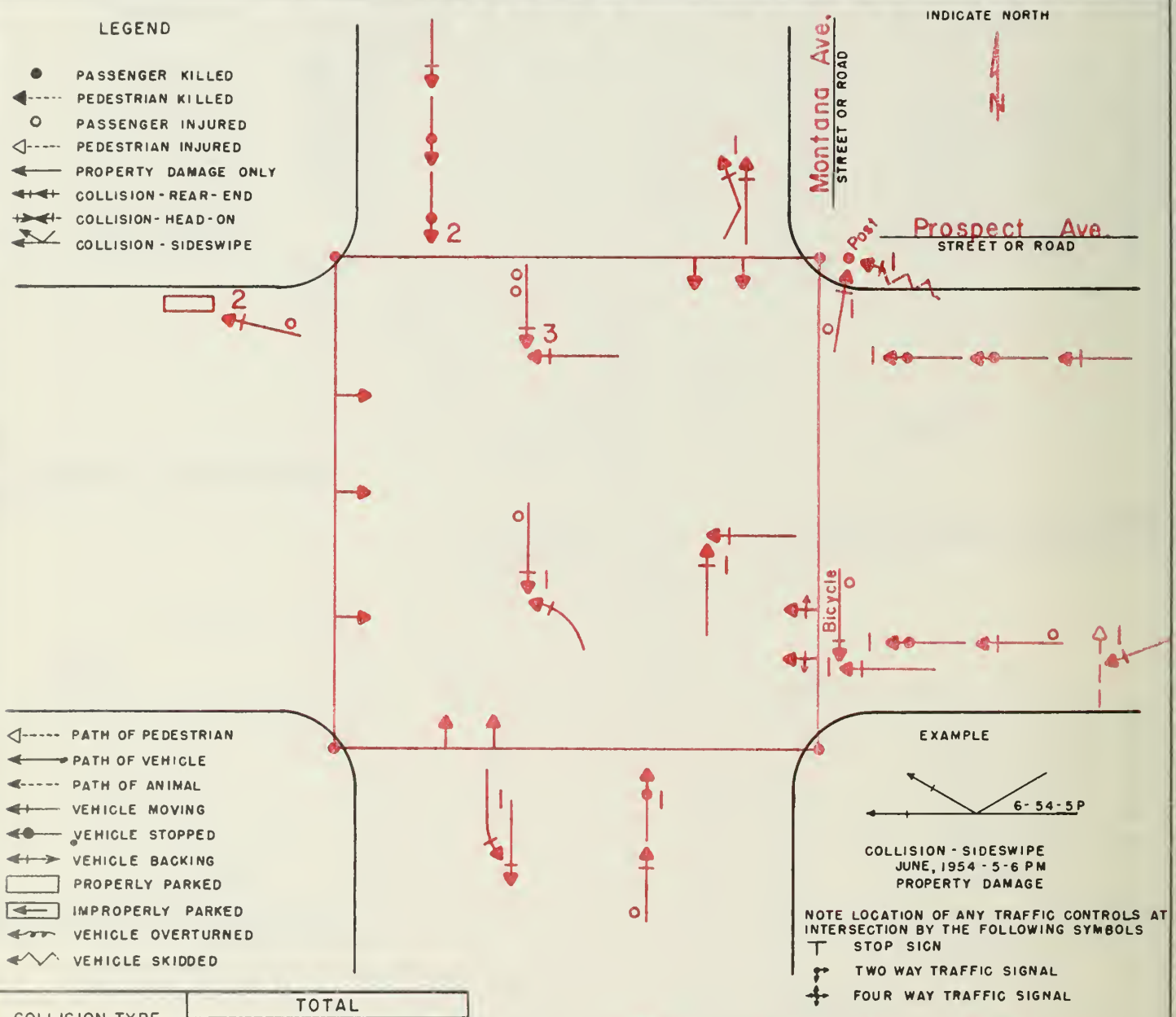
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Montana Ave. AND Prospect Ave.

HIGHWAY NUMBER _____

PERIOD COVERED 1969 1970 1971

COMPILED BY _____ DRAWN BY _____ DATE _____



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		2	2	4
HEAD - ON				
REAR - END		2	3	5
SIDESWIPE			1	1
TURNING MOVEMENT		1	1	2
PARKING				
NON - COLLISION				
FIXED OBJECT		2	2	4
PEDESTRIAN		1		1
BACKING				
MISC.		1		1
TOTAL		9	9	18

REMARKS Prospect Ave. is one-way West bound, up to Montana Ave.

Fig. VIII-6

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Montana Ave. AND Cedar St.

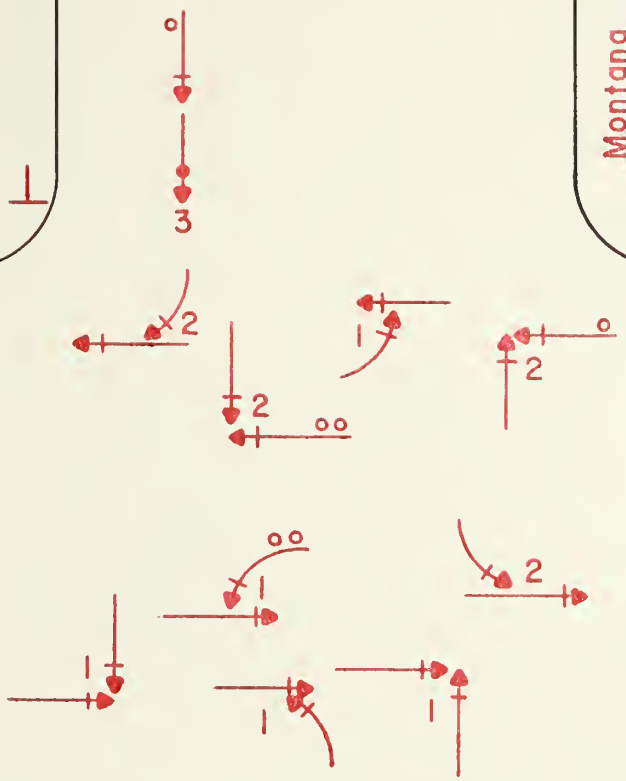
HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE

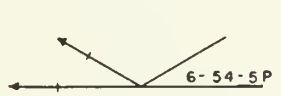
LEGEND

- PASSENGER KILLED
- PEDESTRIAN KILLED
- PASSENGER INJURED
- PEDESTRIAN INJURED
- PROPERTY DAMAGE ONLY
- COLLISION - REAR - END
- COLLISION - HEAD - ON
- COLLISION - SIDESWIPE



- PATH OF PEDESTRIAN
- PATH OF VEHICLE
- PATH OF ANIMAL
- VEHICLE MOVING
- VEHICLE STOPPED
- VEHICLE BACKING
- PROPERLY PARKED
- IMPROPERLY PARKED
- VEHICLE OVERTURNED
- VEHICLE SKIDDED

EXAMPLE



COLLISION - SIDESWIPE
JUNE, 1954 - 5-6 PM
PROPERTY DAMAGE

NOTE LOCATION OF ANY TRAFFIC CONTROLS AT INTERSECTION BY THE FOLLOWING SYMBOLS

- STOP SIGN
- TWO WAY TRAFFIC SIGNAL
- FOUR WAY TRAFFIC SIGNAL

COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		2	4	6
HEAD - ON				
REAR - END		1	4	5
SIDESWIPE				
TURNING MOVEMENT		1	6	7
PARKING				
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		4	14	18

REMARKS

Fig. VIII-7

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

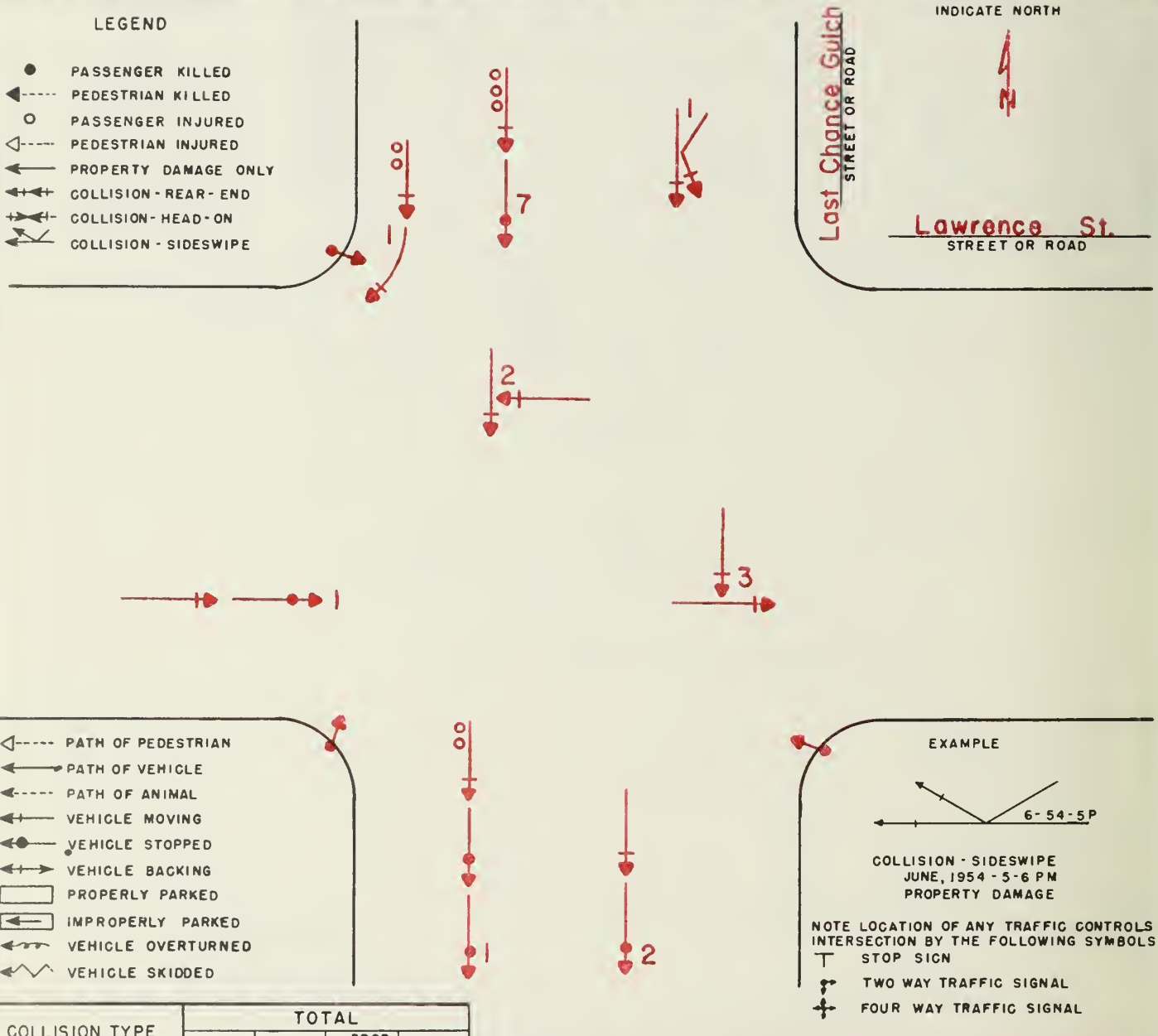
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Lawrence St. AND Last Chance Gulch

HIGHWAY NUMBER _____

PERIOD COVERED 1969 1970 1971

COMPILED BY _____ DRAWN BY _____ DATE _____



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE			5	5
HEAD - ON				
REAR - END		4	8	12
SIDESWIPE			1	1
TURNING MOVEMENT				
PARKING				
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		4	14	18

REMARKS Last Chance Gulch is one-way South bound.

Fig. VIII-8

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

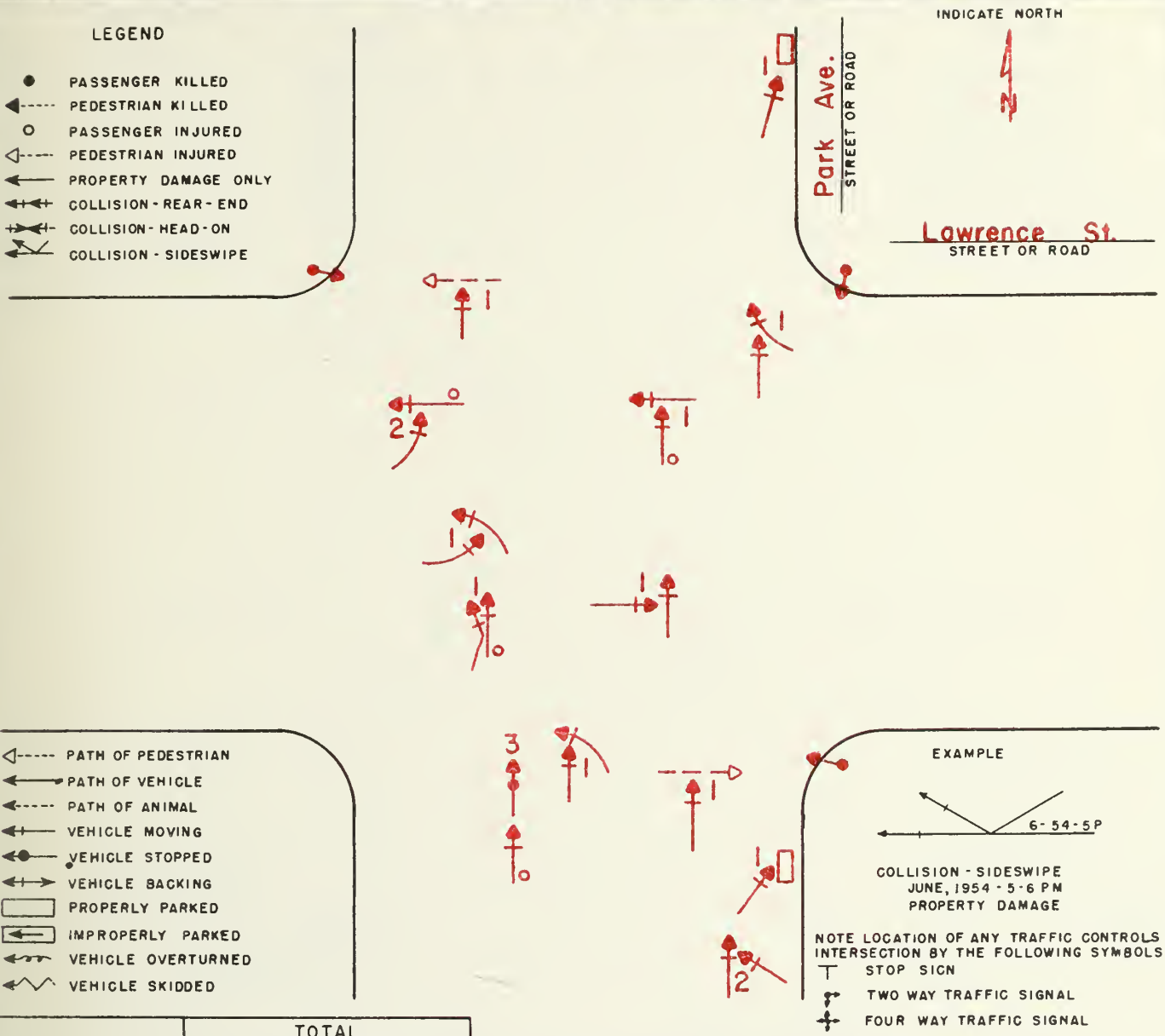
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Park Ave. AND Lawrence St.

HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		1	1	2
HEAD - ON				
REAR - END		1	2	3
SIDESWIPE		1		1
TURNING MOVEMENT		1	4	5
PARKING			2	2
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN		2		2
BACKING				
MISC.			2	2
TOTAL		6	11	17

REMARKS Park Ave. is one-way North bound.

Fig. VIII-9

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

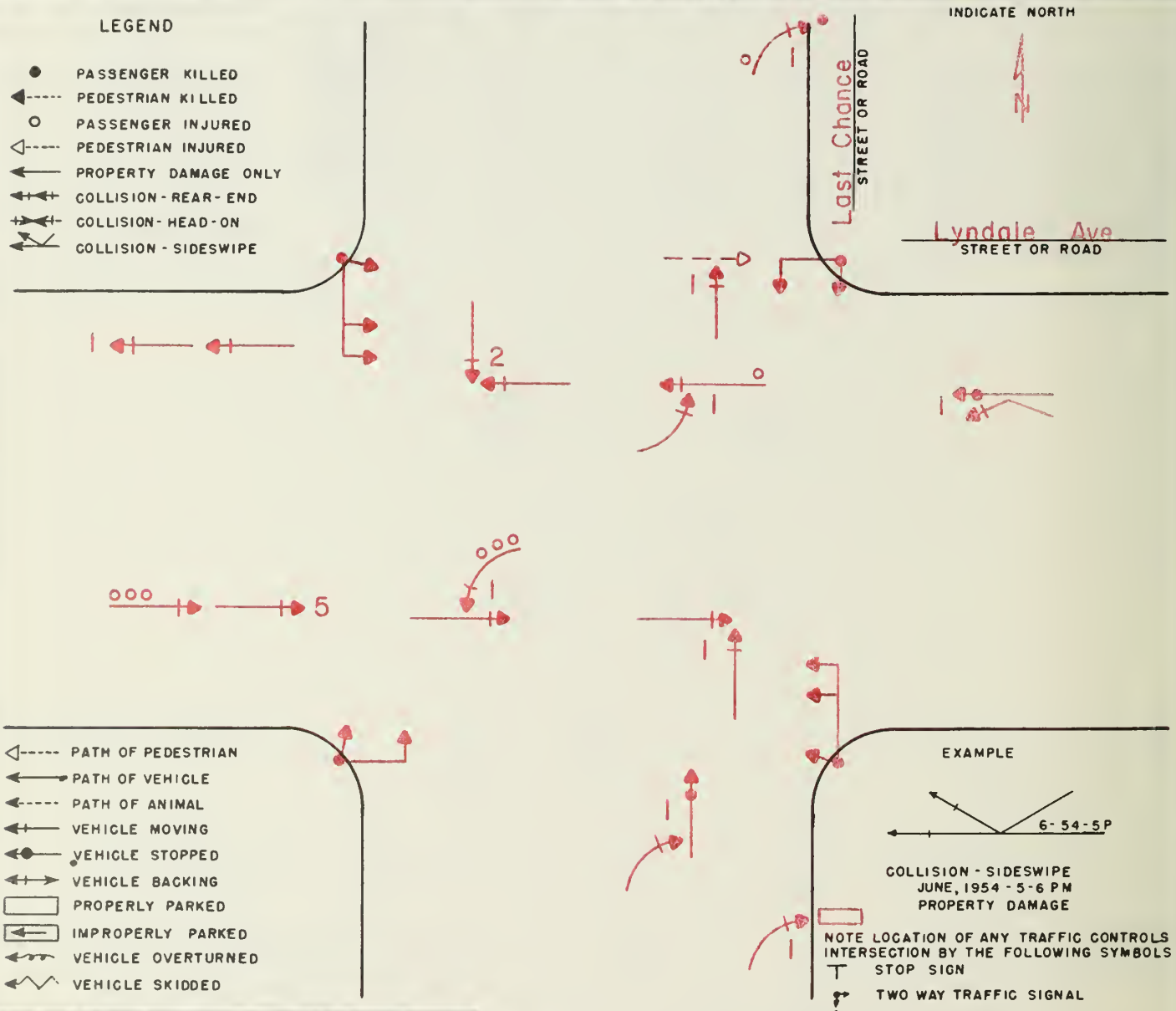
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Lyndale Ave AND Last Chance Gulch

HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE			3	3
HEAD - ON				
REAR - END		2	4	6
SIDESWIPE			1	1
TURNING MOVEMENT		2	1	3
PARKING				
NON - COLLISION				
FIXED OBJECT		1	1	2
PEDESTRIAN				1
BACKING				
MISC.				
TOTAL		6	10	16

REMARKS

Fig. VIII-10

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF 11th Ave. AND Roberts St.

HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE

LEGEND

- PASSENGER KILLED
- PEDESTRIAN KILLED
- PASSENGER INJURED
- PEDESTRIAN INJURED
- PROPERTY DAMAGE ONLY
- COLLISION - REAR - END
- COLLISION - HEAD - ON
- COLLISION - SIDESWIPE

INDICATE NORTH

Roberts St. STREET OR ROAD

11th Ave. STREET OR ROAD

- PATH OF PEDESTRIAN
- PATH OF VEHICLE
- PATH OF ANIMAL
- VEHICLE MOVING
- VEHICLE STOPPED
- VEHICLE BACKING
- PROPERLY PARKED
- IMPROPERLY PARKED
- VEHICLE OVERTURNED
- VEHICLE SKIDDED

EXAMPLE

COLLISION - SIDESWIPE
JUNE, 1954 - 5-6 PM
PROPERTY DAMAGE

NOTE LOCATION OF ANY TRAFFIC CONTROLS AT INTERSECTION BY THE FOLLOWING SYMBOLS

- STOP SIGN
- TWO WAY TRAFFIC SIGNAL
- FOUR WAY TRAFFIC SIGNAL

COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		2	5	7
HEAD - ON				
REAR - END		1	3	4
SIDESWIPE			1	1
TURNING MOVEMENT			4	4
PARKING				
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		3	13	16

REMARKS 11th Ave. is one-way East bound.

Fig. VIII-11

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Prospect Ave. AND Lamborn St.

HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE

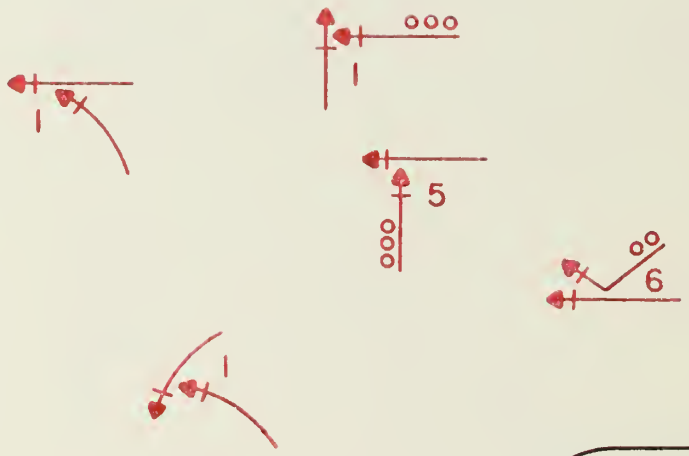
LEGEND

- PASSENGER KILLED
- PEDESTRIAN KILLED
- PASSENGER INJURED
- PEDESTRIAN INJURED
- PROPERTY DAMAGE ONLY
- COLLISION - REAR - END
- COLLISION - HEAD - ON
- COLLISION - SIDESWIPE

INDICATE NORTH

Lamborn St. STREET OR ROAD

Prospect Ave. STREET OR ROAD



- PATH OF PEDESTRIAN
- PATH OF VEHICLE
- PATH OF ANIMAL
- VEHICLE MOVING
- VEHICLE STOPPED
- VEHICLE BACKING
- PROPERLY PARKED
- IMPROPERLY PARKED
- VEHICLE OVERTURNED
- VEHICLE SKIDDED

EXAMPLE

COLLISION - SIDESWIPE
JUNE, 1954 - 5-6 PM
PROPERTY DAMAGE

NOTE LOCATION OF ANY TRAFFIC CONTROLS AT INTERSECTION BY THE FOLLOWING SYMBOLS

- STOP SIGN
- TWO WAY TRAFFIC SIGNAL
- FOUR WAY TRAFFIC SIGNAL

COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		4	2	6
HEAD - ON				
REAR - END				
SIDESWIPE		1	5	6
TURNING MOVEMENT			2	2
PARKING				
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		5	9	14

REMARKS Prospect Ave. is one-way West bound.

Fig. VIII-12

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

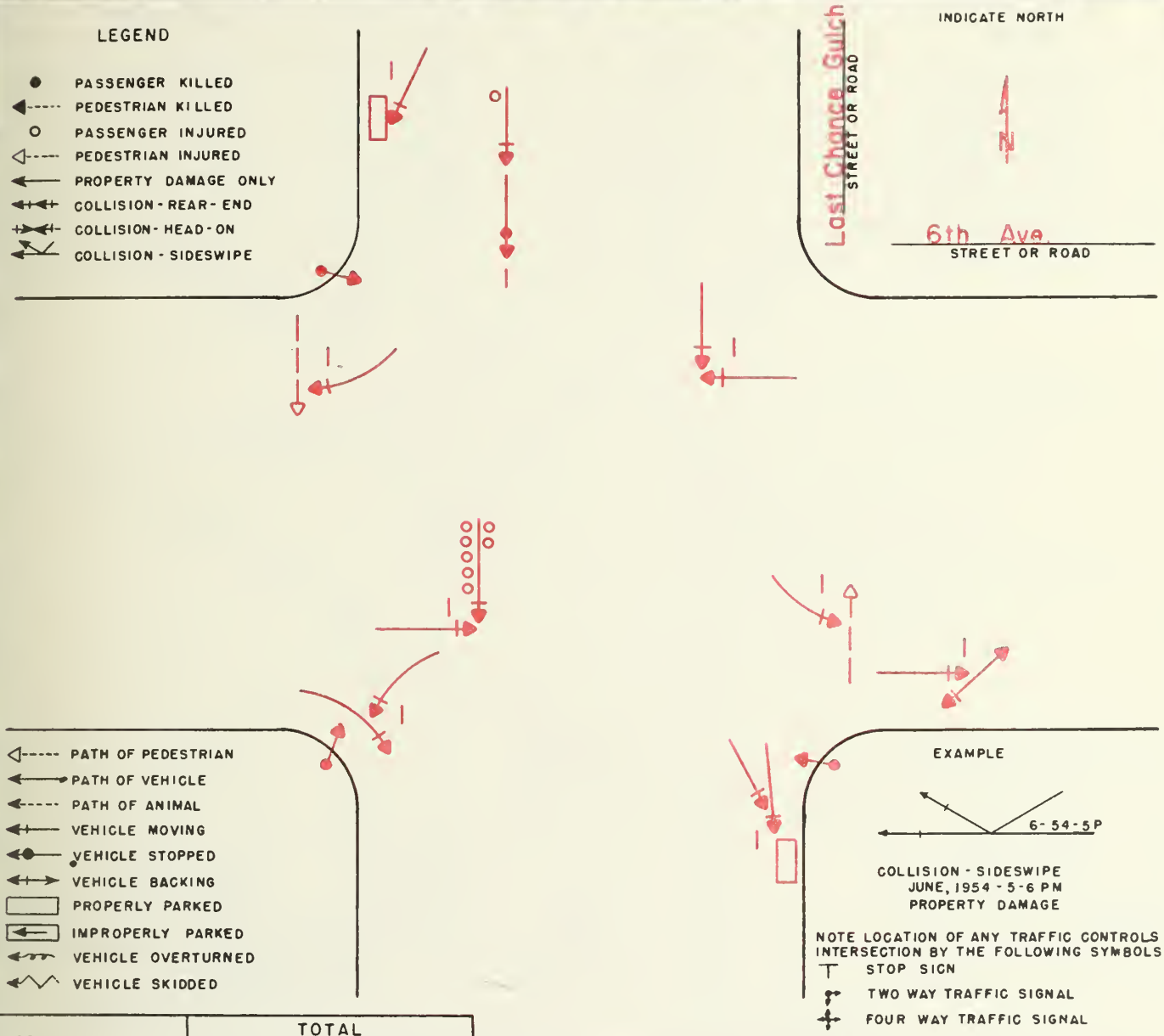
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF 6th Ave. AND Last Chance Gulch

HIGHWAY NUMBER _____

PERIOD COVERED 1969 1970 1971

COMPILED BY _____ DRAWN BY _____ DATE _____



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE		1	1	2
HEAD - ON				
REAR - END		1		1
SIDESWIPE				
TURNING MOVEMENT			2	2
PARKING				
NON-COLLISION				
FIXED OBJECT			1	1
PEDESTRIAN		2		2
BACKING			1	1
MISC.				
TOTAL		4	5	9

REMARKS Last Chance Gulch is one-way South bound.

Fig. VIII-13

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

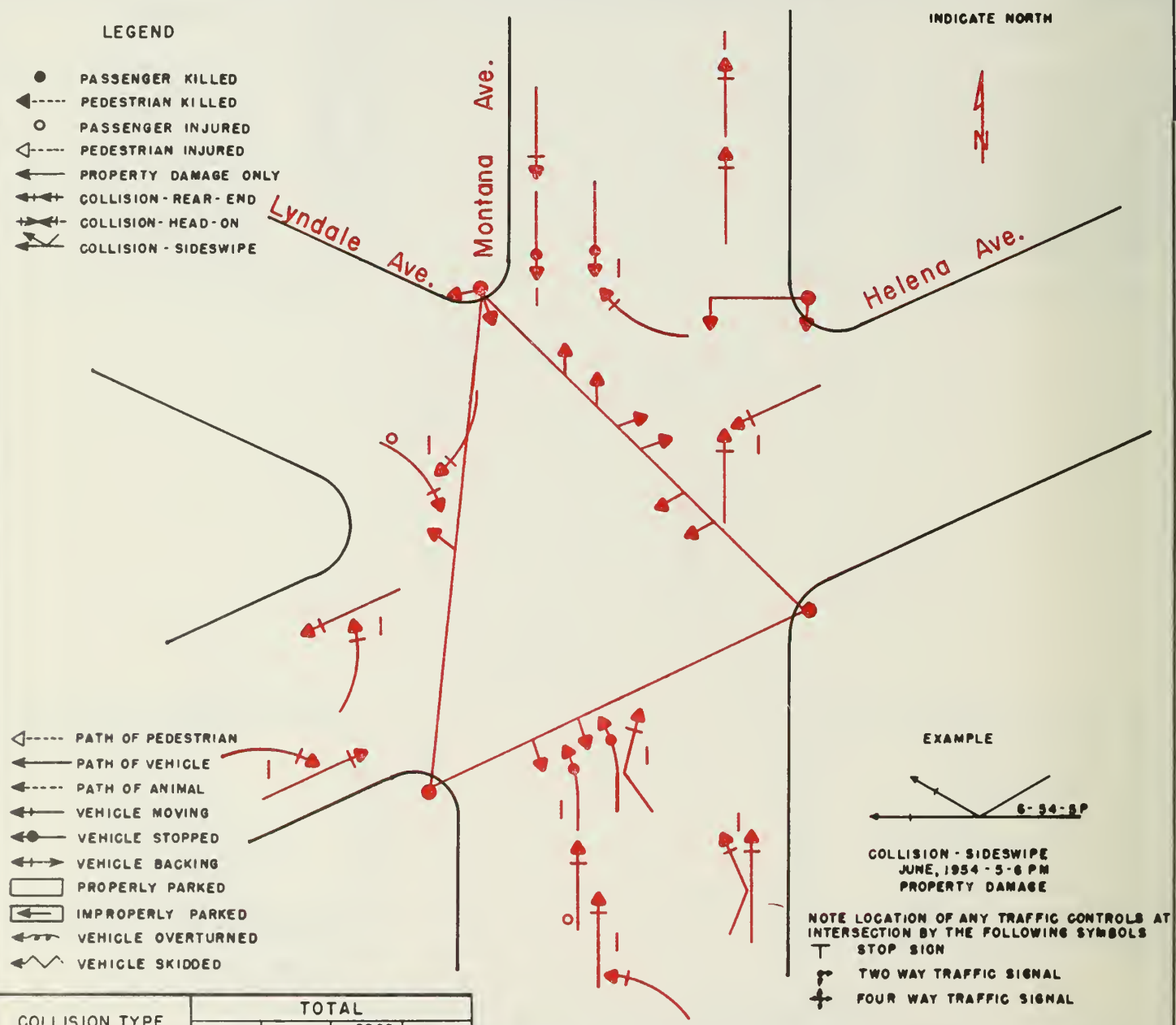
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Lyndale Ave. AND Helena Ave.

HIGHWAY NUMBER Montana Ave.

PERIOD COVERED 1969 1970 1971

COMPILED BY _____ DRAWN BY _____ DATE _____



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE			1	1
HEAD - ON				
REAR - END		1	3	4
SIDESWIPE			2	2
TURNING MOVEMENT		1	3	4
PARKING				
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		2	9	11

REMARKS _____

Fig. VIII-14

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Montana Ave. AND Broadway

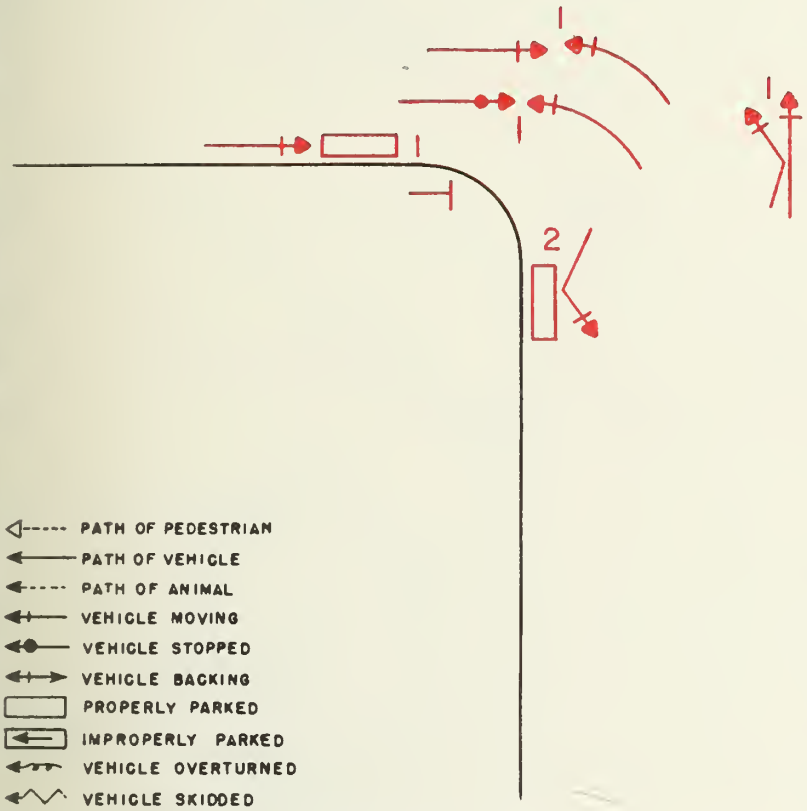
HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE

LEGEND

- PASSENGER KILLED
- PEDESTRIAN KILLED
- PASSENGER INJURED
- PEDESTRIAN INJURED
- PROPERTY DAMAGE ONLY
- COLLISION - REAR - END
- COLLISION - HEAD - ON
- COLLISION - SIDESWIPE



INDICATE NORTH

- PATH OF PEDESTRIAN
- PATH OF VEHICLE
- PATH OF ANIMAL
- VEHICLE MOVING
- VEHICLE STOPPED
- VEHICLE BACKING
- PROPERLY PARKED
- IMPROPERLY PARKED
- VEHICLE OVERTURNED
- VEHICLE SKIDDED

EXAMPLE

COLLISION - SIDESWIPE
JUNE, 1954 - 5-6 PM
PROPERTY DAMAGE

NOTE LOCATION OF ANY TRAFFIC CONTROLS AT INTERSECTION BY THE FOLLOWING SYMBOLS

- STOP SIGN
- TWO WAY TRAFFIC SIGNAL
- FOUR WAY TRAFFIC SIGNAL

COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE				
HEAD - ON				
REAR - END				
SIDESWIPE			3	3
TURNING MOVEMENT			2	2
PARKING				
NON - COLLISION				
FIXED OBJECT			1	1
PEDESTRIAN				
BACKING				
MISC.				
TOTAL			6	6

REMARKS

Fig. VIII-15

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

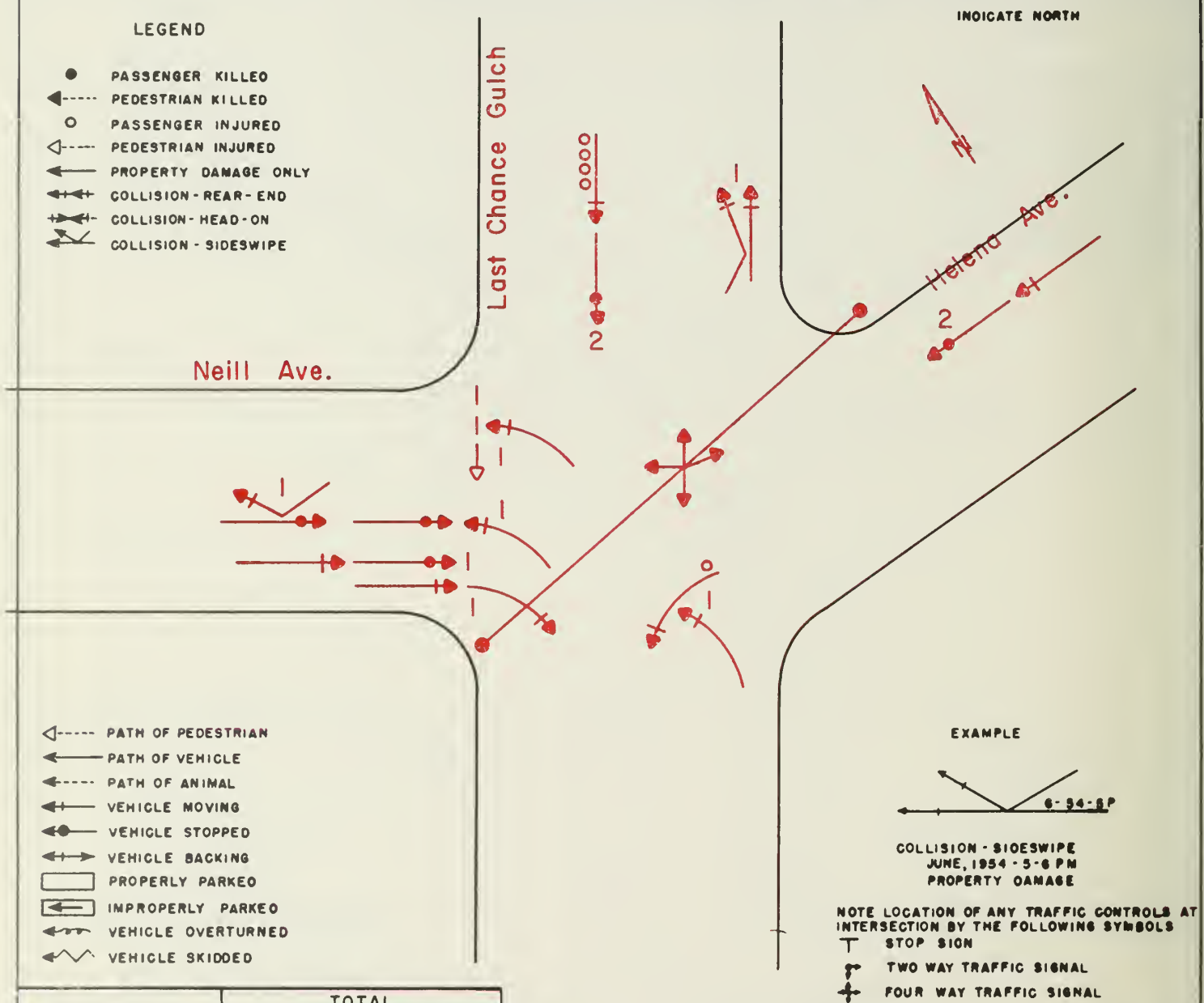
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF Neill Ave. AND Helena Ave.

HIGHWAY NUMBER Last Chance Gulch

PERIOD COVERED 1969 1970 1971

COMPILED BY _____ DRAWN BY _____ DATE _____



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE				
HEAD - ON			1	1
REAR - END		1	5	6
SIDESWIPE			2	2
TURNING MOVEMENT		1		1
PARKING				
NON-COLLISION				
FIXED OBJECT				
PEDESTRIAN		1		1
BACKING				
MISC.				
TOTAL		3	8	11

REMARKS _____

Fig. VIII-16

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT

ACCIDENT ANALYSIS

COLLISION DIAGRAM

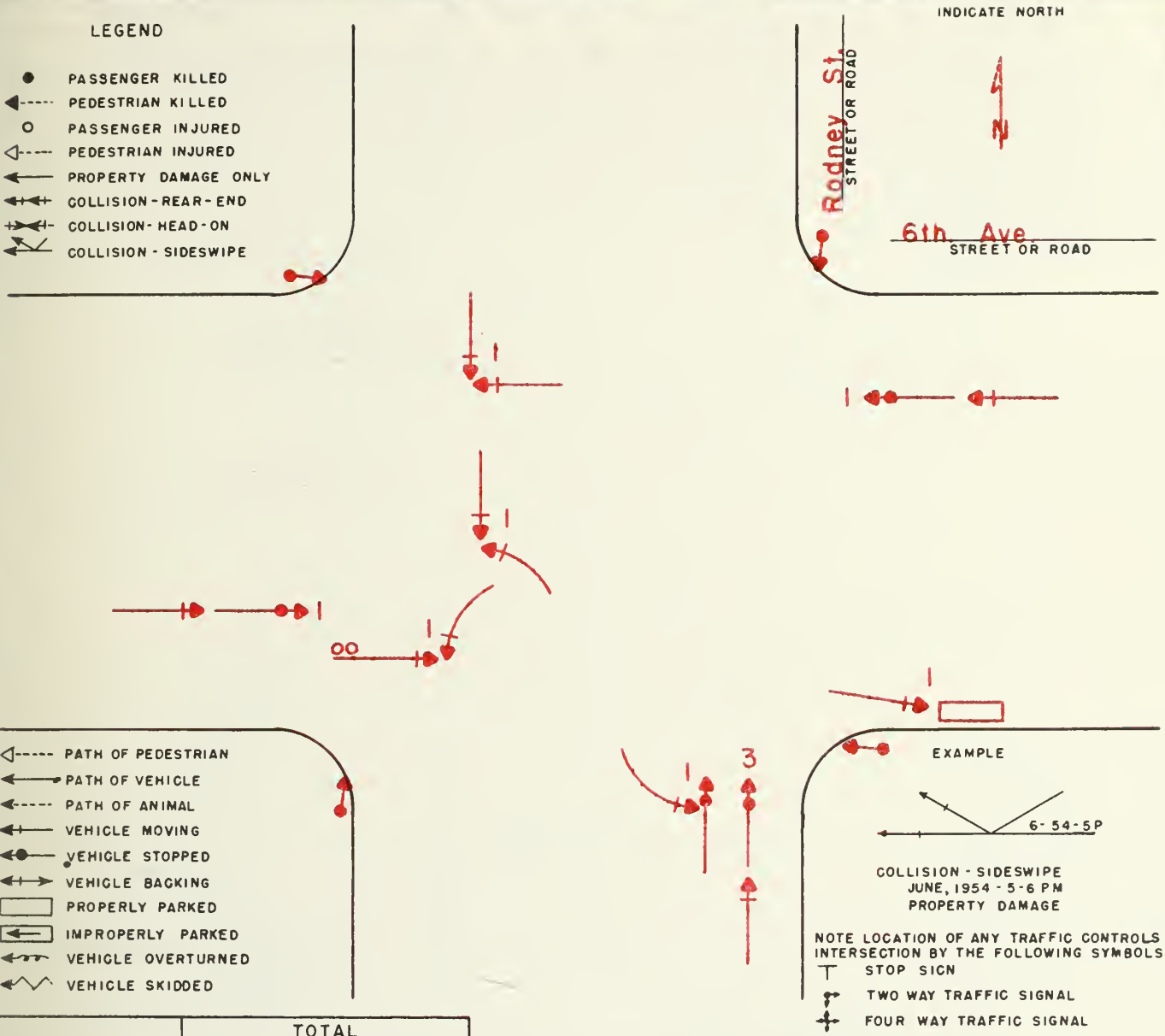
CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF 6th Ave. AND Rodney St.

HIGHWAY NUMBER

PERIOD COVERED 1969 1970 1971

COMPILED BY DRAWN BY DATE



COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE			1	1
HEAD - ON				
REAR - END			5	5
SIDESWIPE				
TURNING MOVEMENT		1	2	3
PARKING			1	1
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		1	9	10

REMARKS

Fig. VIII-17

MONTANA HIGHWAY COMMISSION

TRAFFIC DEPARTMENT
ACCIDENT ANALYSIS

COLLISION DIAGRAM

CITY OF Helena COUNTY Lewis & Clark

INTERSECTION OF 6th Ave. AND Davis St.

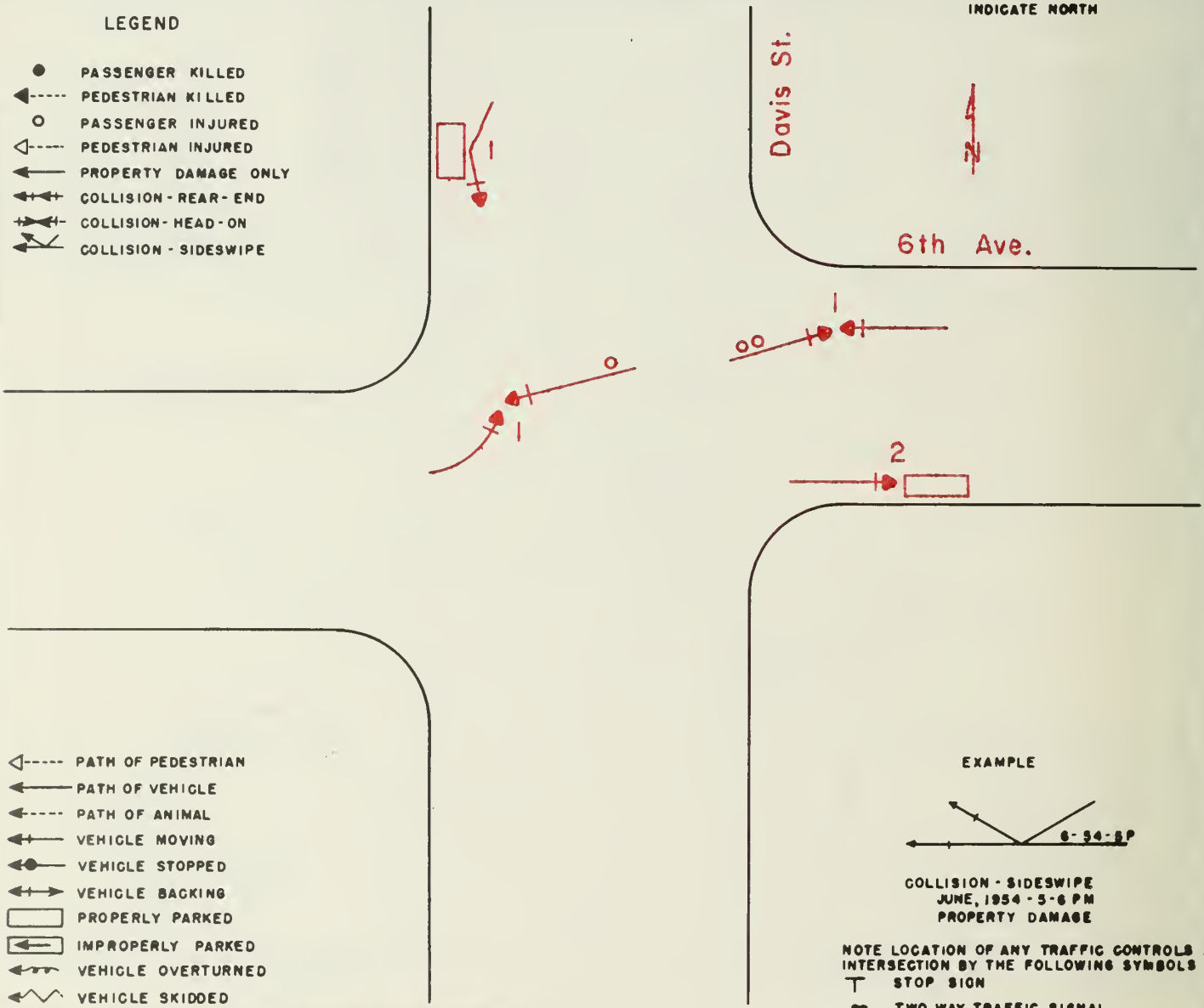
HIGHWAY NUMBER _____

PERIOD COVERED 1969 1970 1971

COMPILED BY _____ DRAWN BY _____ DATE _____

LEGEND

- PASSENGER KILLED
- PEDESTRIAN KILLED
- PASSENGER INJURED
- PEDESTRIAN INJURED
- PROPERTY DAMAGE ONLY
- COLLISION - REAR - END
- COLLISION - HEAD - ON
- COLLISION - SIDESWIPE



- PATH OF PEDESTRIAN
- PATH OF VEHICLE
- PATH OF ANIMAL
- VEHICLE MOVING
- VEHICLE STOPPED
- VEHICLE BACKING
- PROPERLY PARKED
- IMPROPERLY PARKED
- VEHICLE OVERTURNED
- VEHICLE SKIDDED

EXAMPLE

COLLISION - SIDESWIPE
JUNE, 1954 - 5-6 PM
PROPERTY DAMAGE

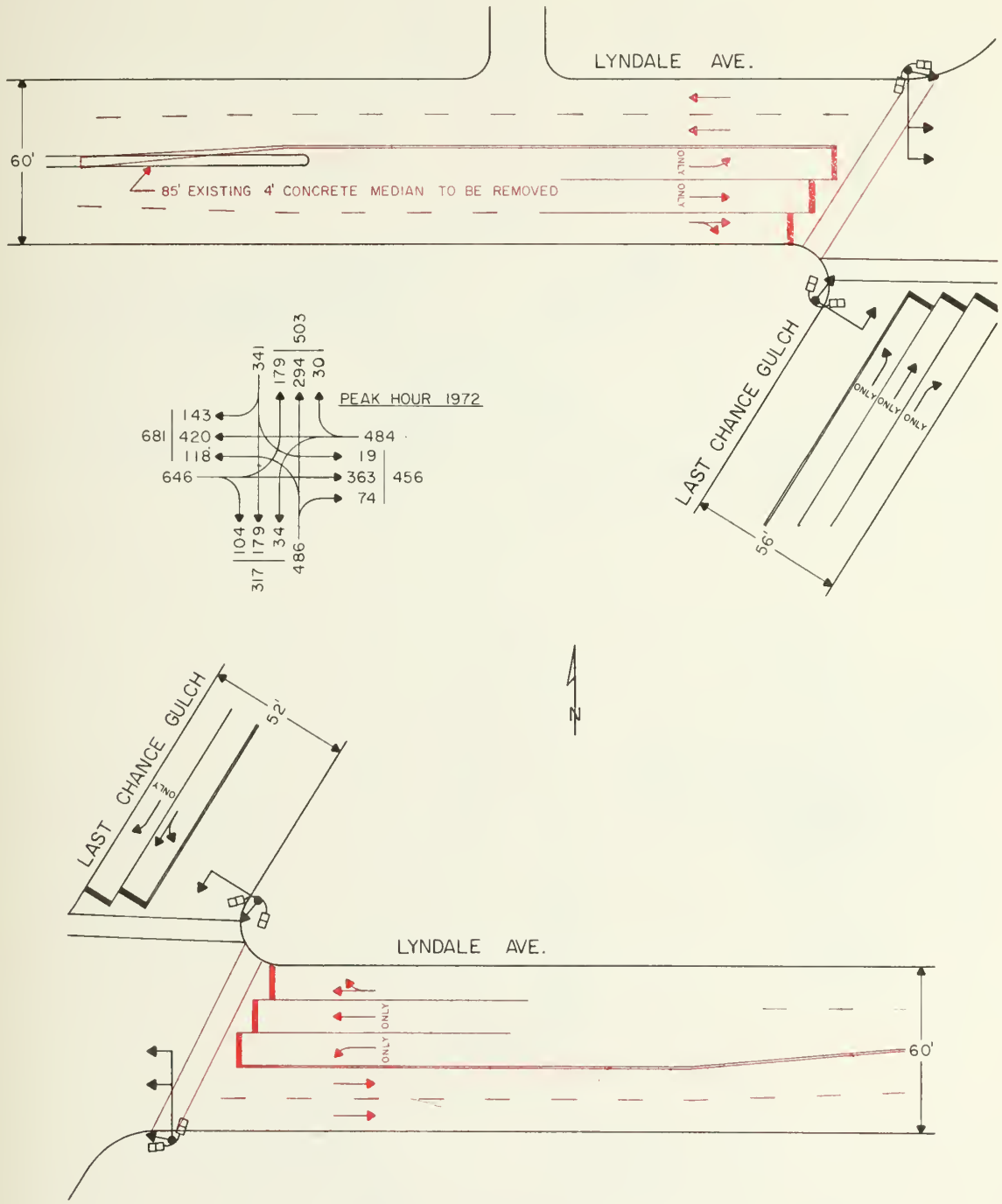
NOTE LOCATION OF ANY TRAFFIC CONTROLS AT INTERSECTION BY THE FOLLOWING SYMBOLS

- STOP SIGN
- TWO WAY TRAFFIC SIGNAL
- FOUR WAY TRAFFIC SIGNAL

COLLISION TYPE	TOTAL			
	FATAL	INJURY	PROP DAMAGE	TOTAL
ANGLE				
HEAD - ON		1		
REAR - END				
SIDESWIPE			1	
TURNING MOVEMENT		1		
PARKING			2	2
NON - COLLISION				
FIXED OBJECT				
PEDESTRIAN				
BACKING				
MISC.				
TOTAL		2	3	5

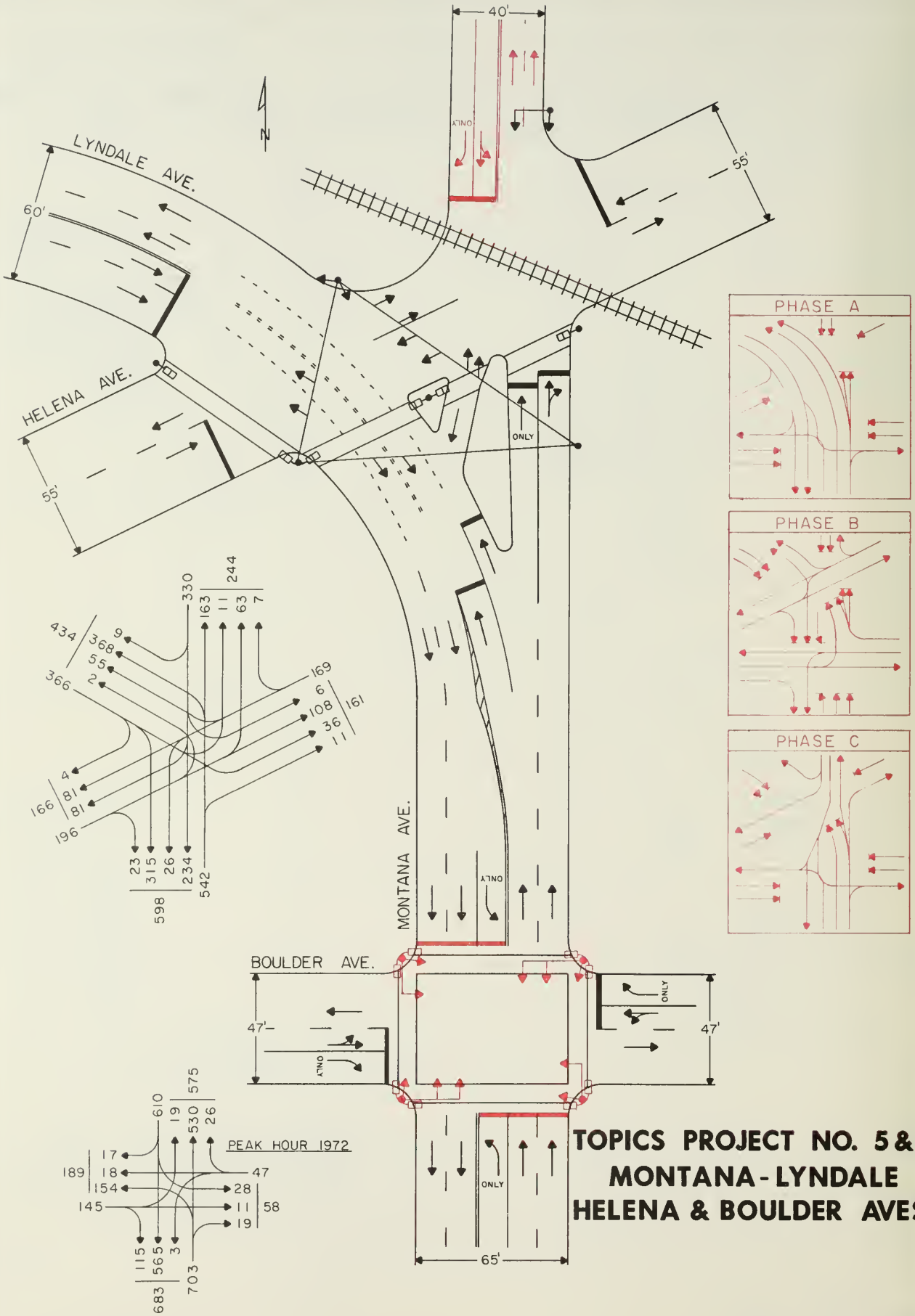
REMARKS _____

Fig. VIII-18



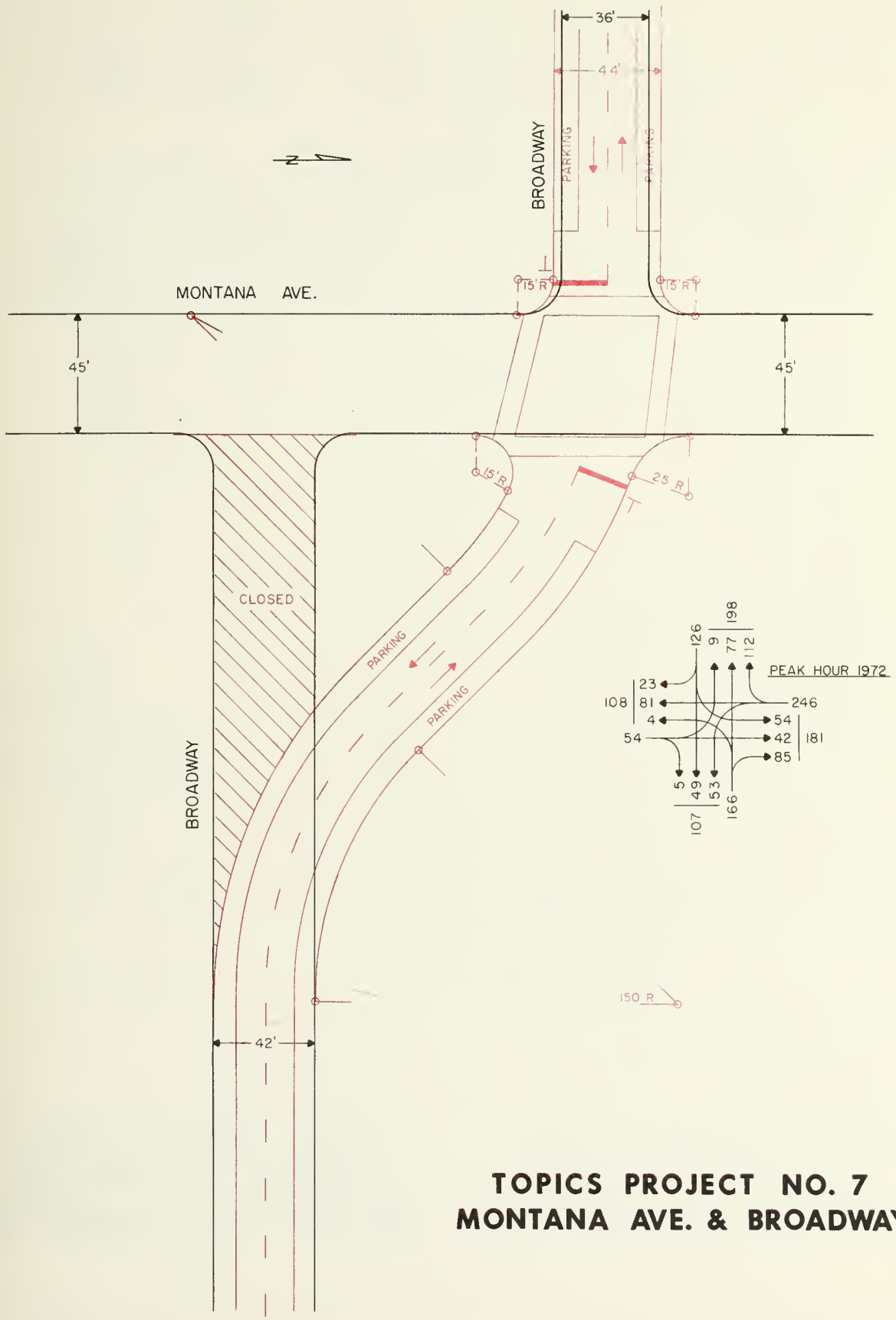
TOPICS PROJECT NO. 2
LAST CHANCE GULCH
& LYNDALE AVE.

Fig. VIII-19



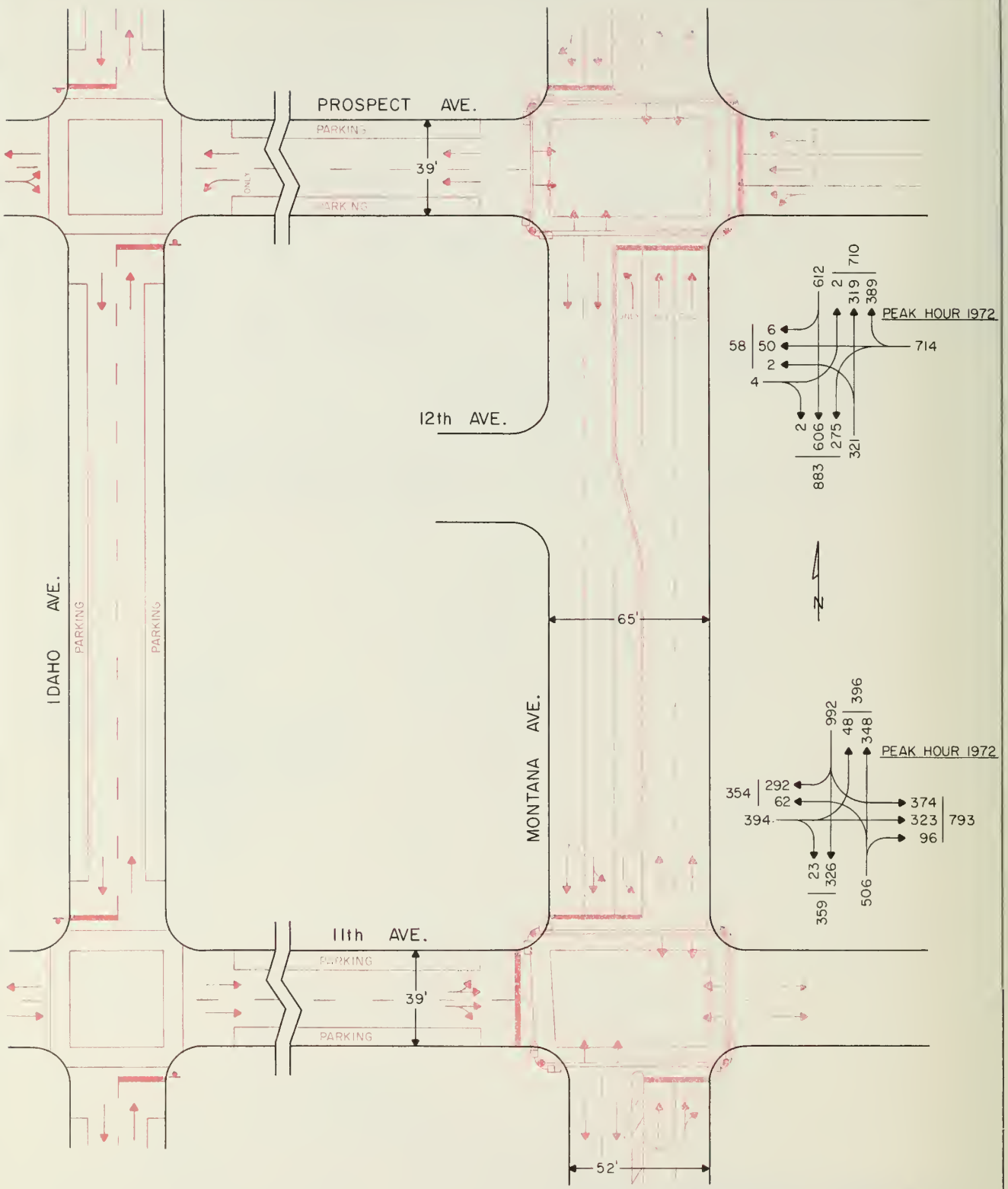
TOPICS PROJECT NO. 5&6
MONTANA - LYNDALE
HELENA & BOULDER AVES.

Fig. VIII-20



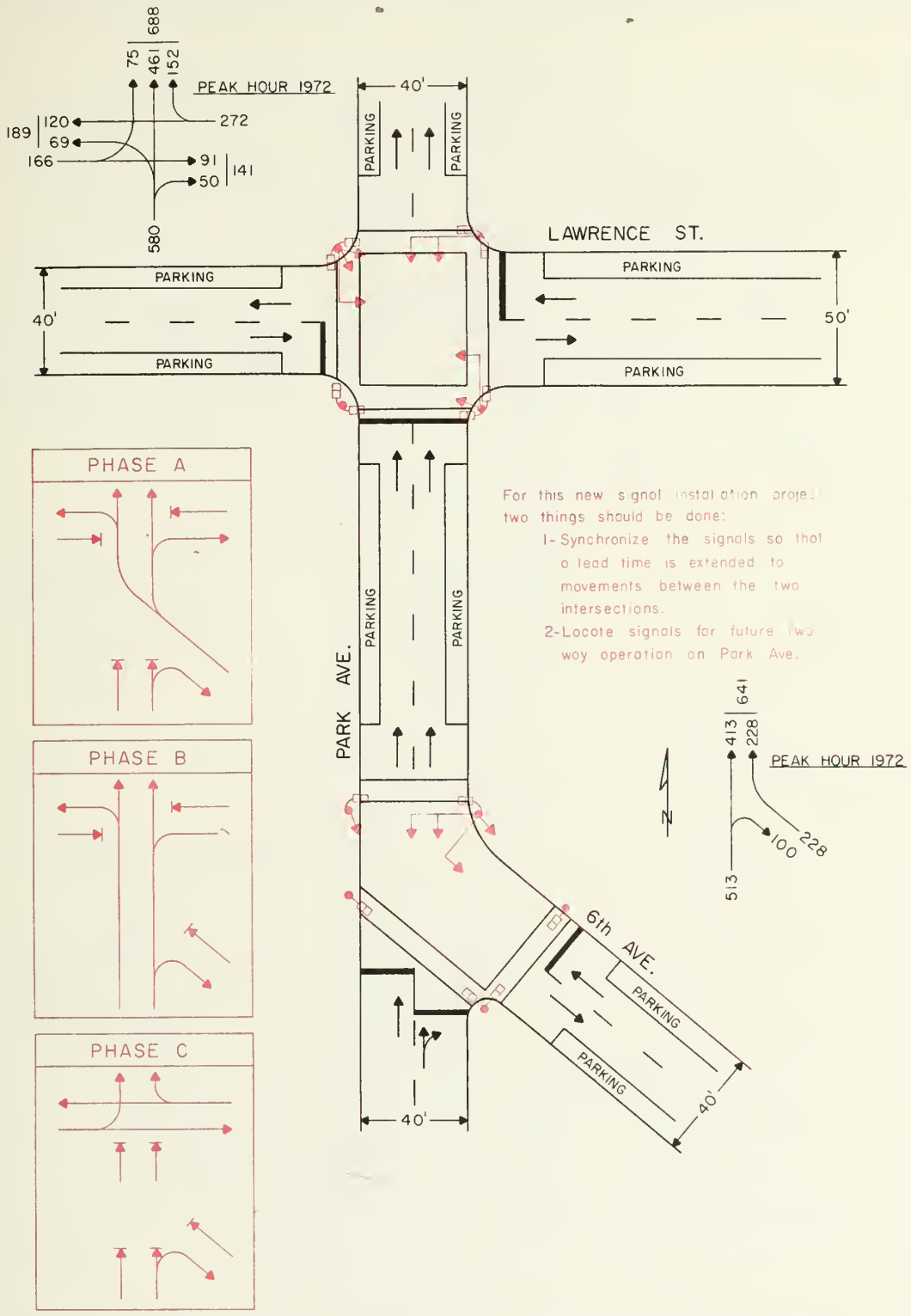
TOPICS PROJECT NO. 7
MONTANA AVE. & BROADWAY

Fig. VIII-21



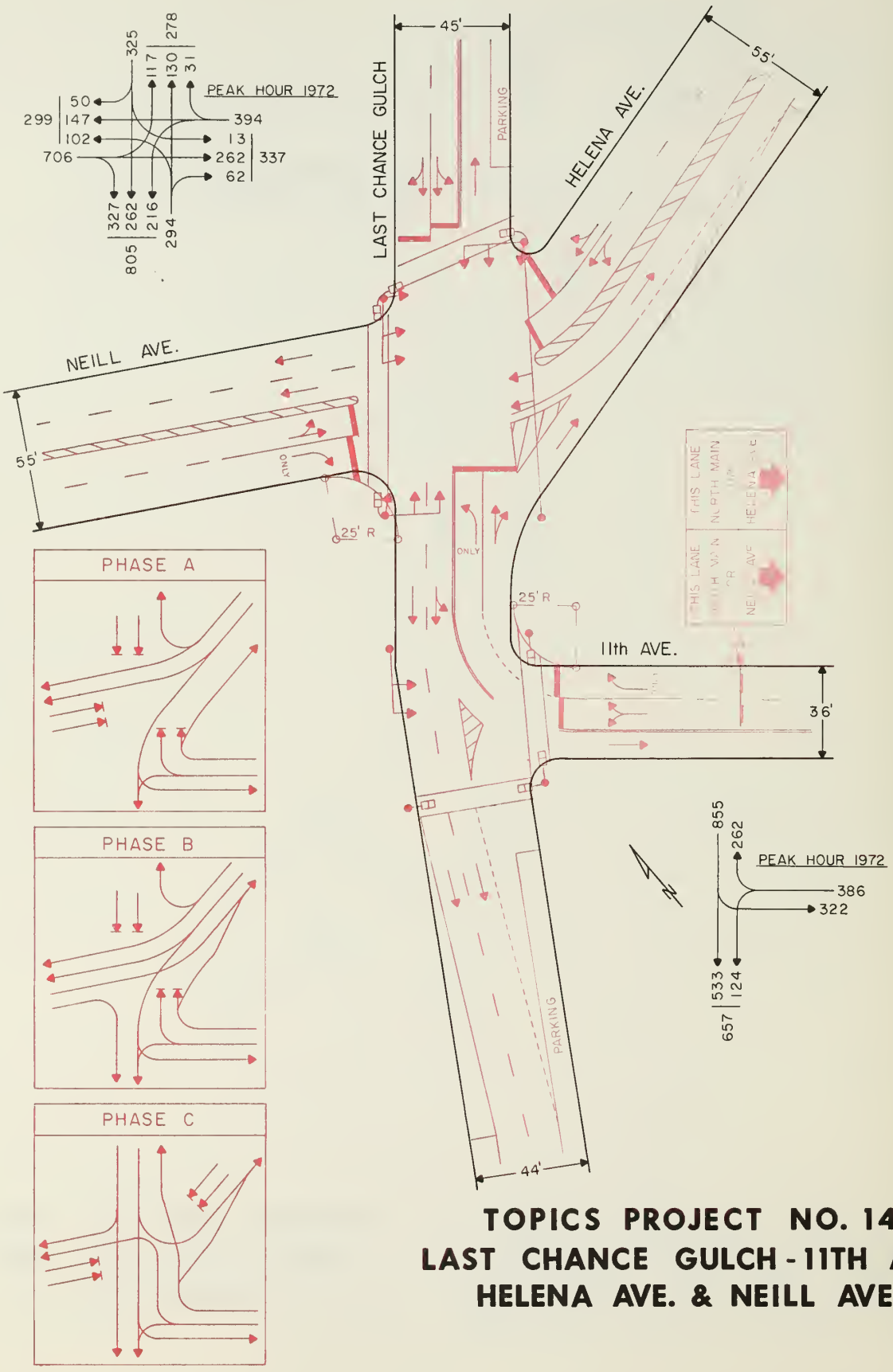
TOPICS PROJECT NO. 8
PROSPECT AVE.-11TH AVE.
MONTANA AVE. & IDAHO AVE.

Fig. VIII-22



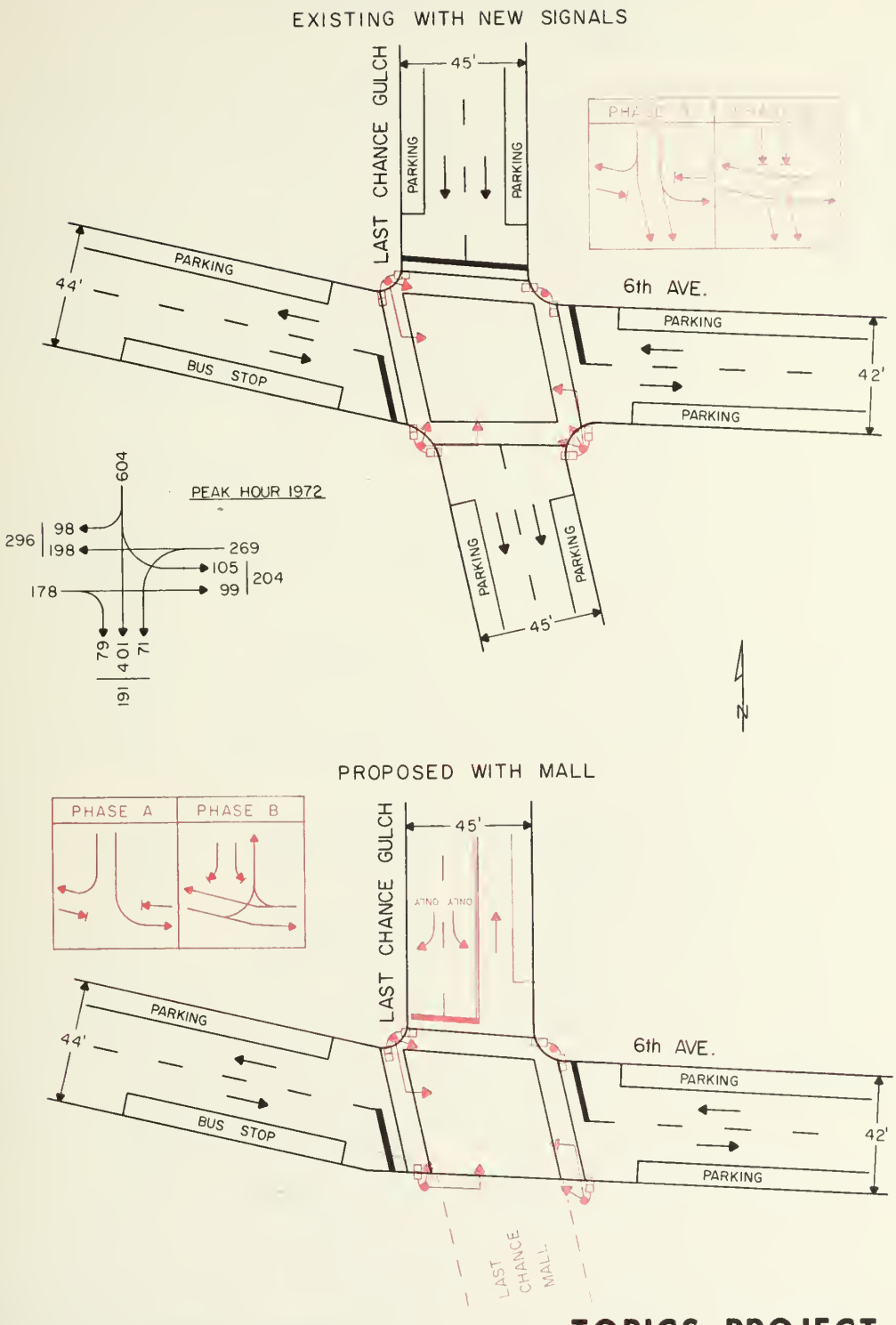
TOPICS PROJECT NO. 11
PARK AVE. - 6TH AVE. & LAWRENCE ST.

Fig. VIII-23



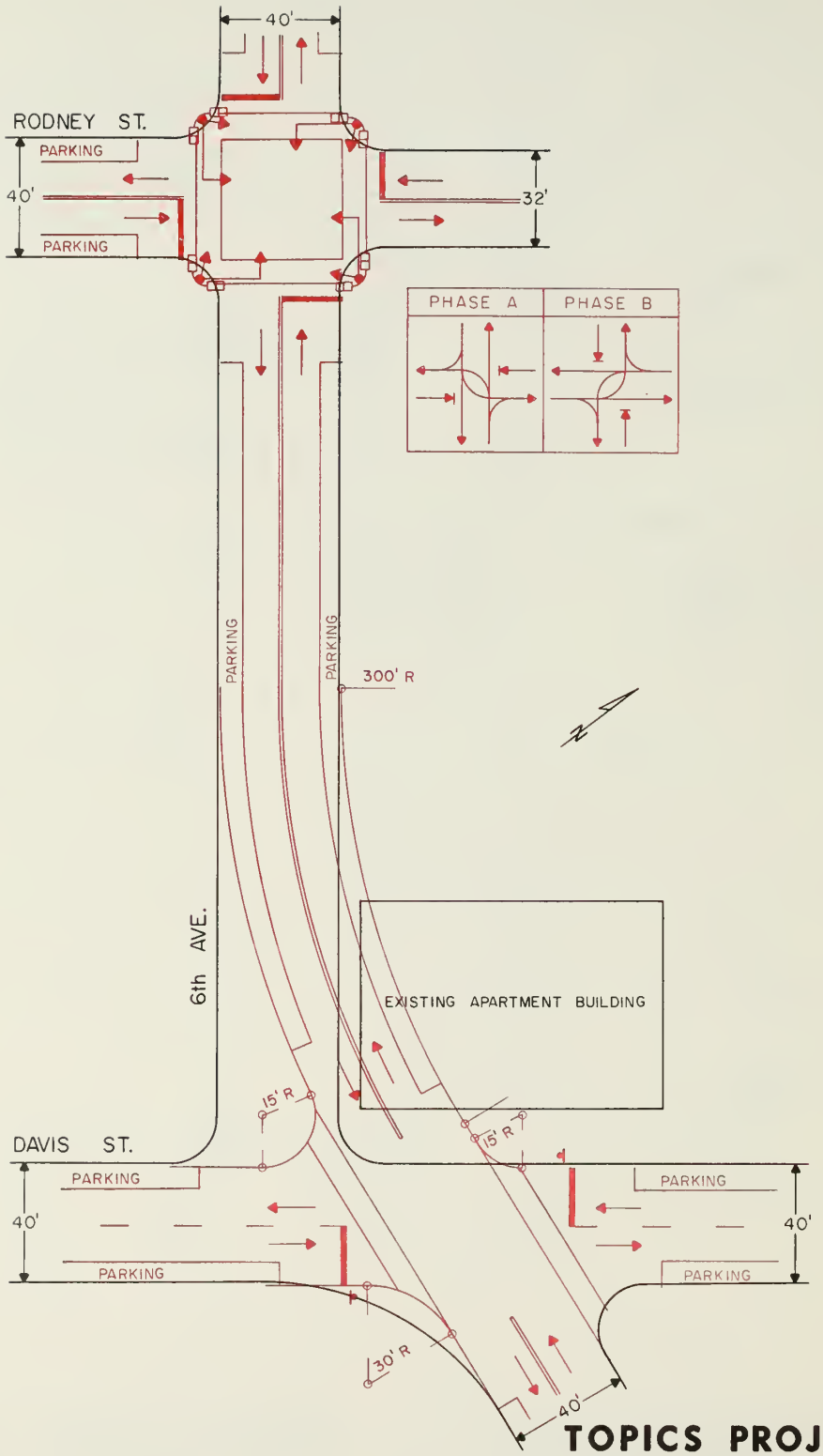
TOPICS PROJECT NO. 14
LAST CHANCE GULCH - 11TH AVE.
HELENA AVE. & NEILL AVE.

Fig. VIII-24



TOPICS PROJECT NO. 15
LAST CHANCE GULCH
& 6TH AVE.

Fig. VIII-25



TOPICS PROJECT NO. 16
6TH AVE. - RODNEY ST.
& DAVIS ST.

Fig. VIII-26

TOPICS PROGRAM
EVALUATION PROCEDURES FOR
EFFECTIVENESS OF IMPROVEMENTS

Location _____

Analysis Area (Intersection/Section & Length)_____

_____ Length _____

Type of Improvement _____

_____

Effective Date of Improvement _____

Traffic

1970 _____ ADT/Peak Hour

19 _____ ADT/Peak Hour

Change _____ = _____ %

Capacity

1970 _____ VPH L.S.= _____

19 _____ VPH L.S.= _____

Accidents

1970 _____ Rate/Number

19 _____ Rate/Number

Change _____ = _____ %

Annual Savings thru Change . . . . . $ _____

Travel Speed

1970 _____ MPH

19 _____ MPH

Change _____ = _____ %

Annual Savings thru Change . . . . . $ _____

AVERAGE ANNUAL MOTORIST SAVINGS
SINCE IMPLEMENTATION OF IMPROVEMENT . . . . . $ _____

REMARKS: _____

_____

_____

Fig. VIII-27

TABLE VIII-3

STATUS OF FEDERAL AID SYSTEM

SYSTEM	STUDY AREA	URBAN AREA
Interstate	7.85	4.35
Primary Rural	0.90	0.00
Primary Extension	7.30	7.30
Urban	27.66	27.66
Secondary	3.16	0.00
Local	156.34	141.88
TOTALS	203.21	181.19

APPENDIX

REPORTS AND STUDIES

HELENA, MONTANA

The following are listed by date of publication:

Past Plans and Studies

Helena Parking Study - 1960, Planning Survey Section, Montana Highway Department. A study of vehicle parking in the central business district.

The Master Plan for the Cities of Helena and East Helena and the County of Lewis and Clark, Montana - 1962, by Ronald Thompson and Associates, Comprehensive Area Plan, based on a land use inventory of 1959.

Traffic Circulation and Parking Inventory and Analysis - by Daily Engineering, December, 1968. Study of traffic movements and vehicle parking in the central business district of Helena, and recommendations for short range improvements.

Preliminary Land Use Inventory and Analysis - May 1968, by Consulting Service Corp. Input to comprehensive area plan.

Land Use and Marketability Study, Last Chance Project - by the staff of Real Estate Research Corporation, April 1969. Analysis of commerical and residential potential within the Urban Renewal Area.

A Plan for the Jurisdictional Area of Helena, Montana - June 1969, by Consulting Services Corporation. Comprehensive urban area plan as adopted the Helena City Commission and the Lewis and Clark County Commission.

Traffic Circulation and Parking Plan - by Clete Daily and Associates, June 1969. Recommendations relating to street thoroughfares and parking facilities in the Urban Renewal Area.

City of Helena and Jurisdictional Area: Population Projections 1968-1990 - by the staff of The City-County Planning Department July 1969. Zonal dwelling unit and population data used as input to the Helena Urban Transportation Study.

Helena Economic Study Report to the Helena Model City Department - Prepared by the staff of Battelle - Northwest, a division of Battelle Memorial Institute, February 1971. Comprehensive economic base study for the City of Helena.

1970 Census of Housing, Block Statistics, Selected Areas in Montana, Butte and Helena - by The Census Bureau, U.S. Department of Commerce, September, 1971.

Urban Renewal Plan - by the Urban Renewal Staff, City of Helena, January 7, 1972. Relates to the eventual reconstruction of the Urban Renewal Area.

North east Quadrant Zoning Study - by the staff of the City County Planning Board, May 16, 1972. Plan for rezoning a section of the city.

City of Helena, Montana Parking Program 1972 - by N. G. Jacobson and Associates Inc., June 1972. Updated recommendations relating to parking facilities in the central business district.

Lewis and Clark County Overall Economic Development Program - June 1972. Analysis of county wide economic factors and potentials for development.

GLOSSARY OF TERMS

ORIGIN AND DESTINATION SURVEY

A survey of travel by motor vehicles, designed to collect detailed information pertaining to the daily movement of vehicles, and persons, into, within and through an area.

INTERNAL PHASE (Home Interview)

That phase of the survey in which travel and other information is collected by interviewing occupants of sample housing units within the study area.

EXTERNAL PHASE (Roadside Interview)

That phase of the survey in which travel information is collected by interviewing vehicle drivers at roadside stations on the study area boundary.

CORDON LINE

A hypothetical line delimiting the study area.

CORDON INTERVIEW STATION

A station set up on a road crossing the cordon line at which traffic counts and roadside interviews are conducted.

SCREENLINE

A line within the study area across which ground counts of vehicular traffic are made. These counts are used to check the accuracy of trip volumes derived from the interviews.

ZONE

A geographical subdivision of the study area to which survey data is related for the purpose of traffic analysis and reporting.

MOTOR VEHICLE

An auto, pickup, or truck.

TRIP

One-way travel of a vehicle from a stated starting point (origin) to a stated first stop for a specific purpose (destination). Stops made to avoid conflict with traffic or to comply with traffic control signs and signals are not considered trips.

TRIP TYPES

3 types of trips are defined by their purpose:
home to work (home based work trips)
home to other (home based other trips)
other to other (non-home based trips)

ORIGIN

Beginning point of a single trip.

DESTINATION

Ending point of a single trip.

INTRAZONAL TRIP

A one-way trip with origin and destination in the same zone.

INTERZONAL TRIP

A one-way trip with an origin in one Zone and destination in another Zone.

WEEKDAY

A typical or average day of a five-day week (Mon-Fri).

PEAK TRAFFIC PERIOD

Those portions of the day during which a section of a roadway experiences its highest vehicle volumes. Generally, weekday peak traffic periods result from morning and late afternoon work trips. Sometimes expressed as Peak Hour.

OFF PEAK TRAFFIC PERIOD

The remainder of the day not included in the peak period

AVERAGE DAILY TRAFFIC (ADT)

The total volume of vehicles moving past a given point on a street, road or highway in a 24 hour period, averaged for 365 days of a specified year.

TRAVEL DAY

A pre-designated day of the week for which complete records of all auto driver trips are obtained from all members of a sampled household.

LAND USE

The purpose for which land and the structures theron are used, classified into major groups, such as residential, commercial, industrial or agricultural.

HOUSING UNIT

A house, apartment, or other group of rooms, or a single room when occupied or intended for occupancy as separate living quarters; such quarters having either a separate entrance and/or separate cooking facilities.

HOUSEHOLD

The entire group of persons who live in one housing unit. It may be several persons living together or one person living alone. It includes the head of household and all other persons living there.

GROUP QUARTERS

Group quarters included such places as hotels, motels, dormitories, and boarding houses. In the case of dormitories, each person, or occupied bed is counted as a group quarter unit; in cases of hotels, motels, etc., the occupied room is counted as the group quarter unit.